
Physical And Chemical Test Results Of Plastic Films

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September 1988



TEST REPORT

Physical and Chemical Test Results of Plastic Films

ISSUED BY

National Aeronautics and Space Administration
Kennedy Space Center
Materials Testing Branch

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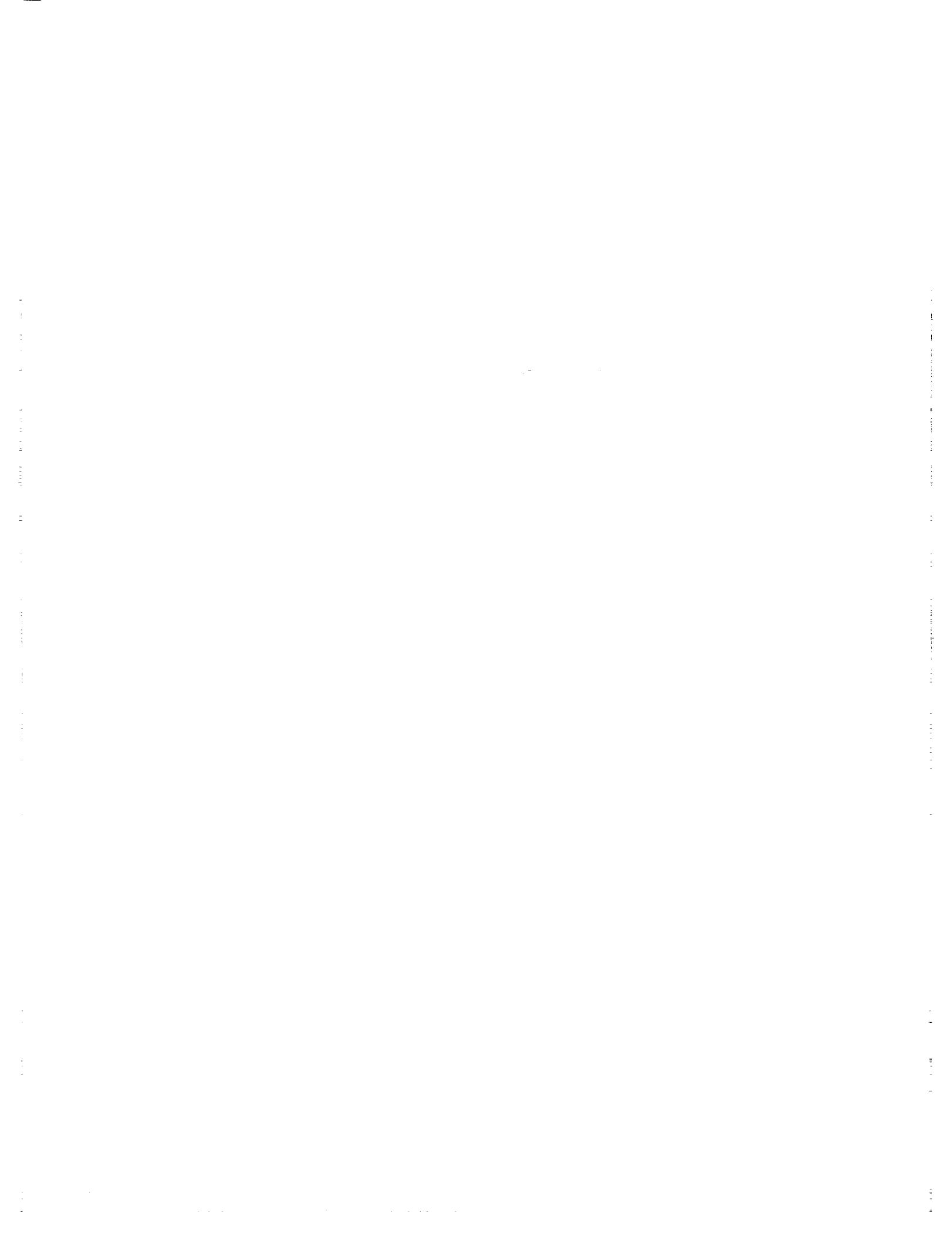
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ABSTRACT

This test program was initiated because a need existed at the Kennedy Space Center (KSC) to have this information readily available to the engineer who must make the choice of which plastic film to use in a specific application. Much of the information contained in this report has never previously been available while the rest was scattered around in numerous special test reports. Included in this report are test results of 59 thin plastic films. Tests were done and the data compiled in the following areas:

- (1) Flammability
- (2) Electrostatics
- (3) Hypergolic compatibility
- (4) Outgassing
- (5) Chemical compatibility
- (6) Spencer Impact
- (7) Optical
- (8) Heat Sealability

Each section contains the test method used to gather the data, the KSC acceptance criteria, and the test results. The results show that none of the materials satisfied all acceptance criteria, however, 5 of the 59 materials satisfied all 3 KSC safety criteria (flammability, triboelectric, and hypergolic compatibility). Fourteen of the 59 materials tested satisfied the outgassing requirements but failed 1 or more of the KSC safety criteria. A "quick-look" summary of the test results is shown on page iv.

Additional materials will continue to be tested and this report will be periodically updated.

SUMMARY OF TEST RESULTS OF PLASTIC FILMOUTGASSING
(TML)

(CYC) (CYC)

IMPACT (PSI)

OPTICAL TESTS

TRANS(%) CLARITY

TESTS

STRENGTH (psi)

HEAT

SEALABILITY

TESTS

THICKNESS

(INCHES)

TESTS

ACKNOWLEDGEMENT

This testing program required much time and effort. We wish to acknowledge the following for their contributions.

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R. H. Gompf, PE	Electrostatic	NASA, Materials Testing Branch
C. J. Bryan	Hypergolic	NASA, Materials Testing Branch
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W. Cambell, Jr J. Park	Outgassing	NASA, Goddard Space Flight Ctr
M. Groah M. Seibring	Chemical Compatibility	NASA, Materials Testing Branch
M. Groah D. Boucher	Spencer Impact	NASA, Materials Testing Branch
G. Melton	Light Transparency	NASA, Materials Testing Branch
K. Ramsey	Optical Clarity	NASA, Materials Testing Branch
Plastic Films Quality Circle Group R. Banta, Leader	Responsible for Obtaining Test Material and Developing Acceptance Criteria	McDonnell Douglas Technical Services Company

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1.0 INTRODUCTION

Thin plastic film materials are used quite extensively at the Kennedy Space Center (KSC) to satisfy a wide variety of needs. Some of the applications include the packaging of both small (transistors) and large (satellites) items, the draping of items up to the size of spacecraft, and for debris shields to shield and protect workers and equipment. However, because of the potential hazards that could result in such uses, certain safety criteria must be satisfied for each plastic film used in or around the launch complex. These films must satisfy the minimum safety standards for flammability, electrostatic charge generation, and hypergolic compatibility. Past experience has shown that few films satisfy all these requirements. To further compound the problem, many payload manufacturers are not familiar with the KSC requirements and therefore ship payloads and parts to KSC in untested and/or unapproved plastic film.

Over the past 20 years plastic films have been routinely tested in the NASA Materials Testing Laboratory, but only for specific applications, as the use dictated. This routine testing has resulted in a large quantity of data, but it was never compiled into a single file. In addition, complete information was not available for every material tested. Because of the need for a more complete file of data on plastic films, a quality circle group was formed. The objective of this group was to establish a technical data base from which plastic films could be selected. The data base would include the results of tests relating to the three previously mentioned mandatory safety standards as well as six other highly desirable parameters.

These six additional parameters were outgassing, various chemical compatibilities, Spencer impact, light transparency, optical clarity, and heat sealability. The group made contacts with many of the leading film manufacturers to obtain candidate materials likely to satisfy the KSC parameters. At present this report covers the first 59 materials received and tested by the Materials Testing Laboratory. Included in this report are the test methods used, the acceptance criteria used by KSC, and the data gathered. Additional materials continue to be received and addendum reports will periodically be issued. A complete summary of test data is included in Table 17. This summary shows that the ideal material still has not been identified; however, the data provided should be very helpful in making material selections based on applicable engineering constraints.

2.0 FLAMMABILITY TESTING

A fire near the orbiters, payloads, ordnance materials, hypergols, or practically anywhere at KSC could potentially destroy millions of dollars worth of equipment and endanger hundreds of lives. To reduce the risk of fire, materials in controlled areas must decrease the probability of ignition to a minimum and restrict potential fires to well-defined isolated areas. The following parameters are used to determine the flammability characteristics (i.e., combustibility, propagation rate, self-extinguishing properties, and total burn time) of plastic films.

2.1 Test Specification - "Flammability, Odor, and Offgassing Procedures for Materials In Environments that Support Combustion," NHB 8060.1, 1981, Test No. 1 (upward propagation test). The film was cut into 2.5

by 12-inch rectangles and impaled on a needle rake (i.e., a metal holder with needles spaced approximately 3 inches apart lengthwise and 2 inches apart widthwise). The sample's bottom edge was located at least 3 inches from the base of a hood. A 1.5 inch blue flame from a 0.375 inch diameter bunsen burner was placed directly beneath the sample's bottom edge with approximately half of the flame contacting the sample. The flame was removed after 20 seconds. The distance that the flame progressed before extinguishing, the total burn time, the flame propagation rate, and visual observations were recorded. Three samples of each material were tested.

- 2.2 Acceptance Criteria - Materials shall be considered noncombustible, or self-extinguishing if, less than 6 inches of the sample is consumed, and the time of burning does not exceed 10 minutes. There shall be no sparking, sputtering, or dripping of flaming particles from the test sample. A failure of any one of three samples constitutes failure of the material.
- 2.3 Results - Table 1 (pages 12 - 14) lists the burn lengths, burn times, propagation rates, dripping of flaming particles, and the overall evaluations of each material.

3.0 ELECTROSTATIC TESTING

Increasing attention is being given to the problem of static electricity because of its ability to damage or destroy certain semiconductor devices, unexpectedly initiate ordnance devices, ignite explosive atmospheres, and surprise workers performing critical tasks, causing

undesirable consequences and injuries to occur. Thin materials such as plastic films are some of the most likely materials to develop damaging static charge buildup. The triboelectric test device used to evaluate the electrostatic properties of the materials in this report was developed at KSC. It evaluates two distinct electrostatic properties of a material. One is the material's capability to develop a charge. This property is shown by the peak triboelectric voltage generated. The second property is the ability to discharge this surface electrical charge to a grounded frame. This is best shown by the decay curve shape and/or the voltage remaining 5 seconds after rubbing has ceased.

3.1 Test Specification - (1979, Malfunction/Materials Analysis Section, Materials Analysis Branch, Fluids and Analysis Division, Ground Systems Directorate. MMA-1985-79) The film was cut into ten 7.6 inch square samples. These ten samples were then stored for a minimum of 24 hours at 45 percent relative humidity. After storage, they were mounted in the grounded test fixture and tested at this humidity value. They were then stored at 30% relative humidity for an additional 24 hours and tested again. The test consisted of rubbing each test sample for 10 seconds with a foam backed felt Teflon rubbing wheel to triboelectrically generate the charge. The charged material was then placed in front of the detector head which measured the surface voltage generated. This voltage was received by a digital storage oscilloscope which produced a display of voltage versus time as well as a digital readout.

- 3.2 Electrostatic Acceptance Criteria - Materials were considered acceptable for use at KSC if the electrostatic voltage generated by the triboelectric device decayed below 350 volts in 5 seconds.
- 3.3 Tables 2 and 3 (pages 15 - 20) list the results and evaluations of the electrostatic testing at 30% and 45% relative humidity.

4.0 HYPERGOLIC COMPATIBILITY TESTING

Since plastic films are used as protective coverings, they must protect equipment and supplies from damaging chemicals and contaminants. The hypergolic compatibility test identifies those films that may not resist hypergolic exposure and therefore may not protect equipment from hypergolic fluids.

- 4.1 Test Specification - The test samples were tested for compatibility with the following hypergolic fluids: Monomethyl hydrazine, nitrogen tetroxide, and hydrazine. Two separate tests were run on each sample of material. In the first test the samples were cut into 2-inch squares, placed on watch glasses, and 0.5 ml of the appropriate hypergolic fluid was placed in the middle of each test specimen. The specimens were observed for 10 minutes in this configuration and monitored for temperature rise. In the second test the samples were cut into 4-inch squares, individually positioned over a glass beaker, and 1.0 ml of the appropriate hypergolic test fluid was placed in the middle of each test specimen. These specimens were observed for 10 minutes in this configuration and monitored for penetration.

4.2 Acceptance Criteria - For the first test, the material shall not ignite nor have a temperature rise greater than 5 degrees Fahrenheit with either hydrazine or monomethyl hydrazine. For the second test, no penetration through the sample is allowed.

4.3 Results - Table 4 (pages 21 - 23) lists the evaluations and results of the hypergolic compatibility test.

5.0 OUTGASSING TEST

Plastic films are used in abundance in and around the shuttle spacecraft and its variety of payloads. They provide protection from potentially-damaging chemicals, radiation, and other contaminants. However, it is possible that the plastic film itself could become a source of contamination, especially to sensitive optical surfaces. This type of contamination could occur through the outgassing of vapors that recondense on an optical surface. Certain systems of the shuttle orbiter and its payloads are especially sensitive to this type of contamination. The outgassing test is done to evaluate the plastic film as a potential source of contamination. The parameters measured are: total mass loss (TML), collected volatile condensable materials (CVCM), and water vapor regained (WVR).

5.1 Test Specification - (ASTM Method E595-83) The tests for TML, CVCM, and WVR were done as specified in the reference ASTM test. Briefly stated, the test specimen is conditioned in a degreased container (boat) at 23°C and 50% relative humidity for 24 hours. The boat with the sample is then weighed and placed in a vacuum below 10^{-4} Torr with the sample

temperature maintained at 125°C. The vapor released from the sample is condensed on a previously weighed collector plate maintained at 25°C. After 24 hours, the vacuum chamber is repressurized with a dry inert gas and the specimen and collector plates are weighed. The sample is then stored for 24 hours at 23°C and 50% relative humidity and again weighed. The TML, CVCM, and WVR are then calculated from the test data.

- 5.2 Acceptance criteria - For flight hardware the material's TML should not exceed 1.0% and the CVCM should not exceed 0.1%. For non-flight materials these values for TML and CVCM may be surpassed with the approval of the appropriate materials engineer.
- 5.3 Results - Table 5 (pages 24 - 25) shows the results of the TML, CVCM, and WVR tests.

6.0 CHEMICAL COMPATIBILITY TESTING

In the vicinity of the spacecraft and its payload the possibility of a fuel spill or spill of certain other liquids is always present. In order to reduce the undesirable and possible hazardous effects of such an occurrence, only those plastics not adversely affected by those fuels and liquids are used in this area. The chemical compatibility test was developed by KSC personnel in order to evaluate a materials relationship to those fluids of interest.

- 6.1 Test Procedure - Six "dogbone" samples were cut from those materials without fiber reinforcements. For those materials with fiber reinforcements, six 1-inch

by 6-inch strips were cut. These samples were then placed in a beaker and covered with the test fluid. After 5 minutes of exposure, three samples were removed and immediately rinsed for 1 minute under flowing water. After 1 hour of exposure, the other three samples were removed and also similarly rinsed. Each sample was visually examined for deleterious effects immediately after rinsing. The samples were allowed to dry over night and were visually examined again. Finally the samples were tested for peak stress and break strain. The test fluids were: Aerozine-50; anhydrous ammonia; citric acid (14-17%); Freon 113; hydraulic fluid (flight), MIL-H-83282; hydraulic fluid (GSE), MIL-H-5606; hydrazine; hydrochloric acid (35%); isopropyl alcohol; methyl ethyl ketone; monomethyl hydrazine; nitric acid; nitrogen tetroxide; sodium hydroxide (25%); and unsymmetrical dimethyl hydrazine.

- 6.2 Acceptance Criteria - The sample material cannot have a significant reaction to any fluid nor lose any properties which would add to the potential hazards involved in a fuel spill. A change exceeding 25% in the peak stress or break strain also constitutes failure of this test.
- 6.3 Test Results - The results of the chemical compatibility testing are shown in Table 6 - 13A (pages 26 - 55).

7.0 SPENCER IMPACT TESTING

For certain KSC uses of plastic films, such as debris shields and packaging materials, the impact resistance is an important parameter. The Spencer Impact attachment with

an air clamp assembly was used on an Elmendorf Tearing Tester as the testing device for this test. This test is intended as a quick, practical test to compare impact resistance of films of the same general type at ambient temperature.

- 7.1 Test Procedure - ASTM D3420-83, Procedure B, was used to do the testing. Briefly stated, the thickness of the sample was measured and then placed in the air clamp assembly. The 3200-gram pendulum was raised with the 3/4 inch diameter (0.5 inch spherical radius) puncture head, the zero indicator set, and the pendulum released. The head passed through the sample (note: The procedure resistance of some samples exceeded the test limitations of this specific apparatus and were not punctured) and was raised and reset in the latched position. The scale reading was recorded and the Spencer Impact strength was calculated in pounds per square inch.
- 7.2 Acceptance Criteria - No KSC minimum acceptance values have been established for this test.
- 7.3 Test Results - The test results of the Spencer Impact Test are shown in Table 14 (pages 56 - 58).

8.0 OPTICAL TESTING

Plastic films are used for draping of spacecraft and equipment, debris shields, and packaging of materials. In such applications the ability to transmit light and/or the ability to visually see through a material is often a highly desirable quality. In order to develop a quantitative method to compare various materials, the KSC

Materials Testing Laboratory developed the optical light transmission test and the optical clarity test.

8.1 Test Procedures

8.1.1 Light Transparency Test - In this test a light meter (such as the Photovolt Model 501M) is placed under a light source and the light intensity is adjusted to make the meter read 100%. The film to be tested is then placed over the light meter and the new reading is recorded as the percent light transmission.

8.1.2 Test Procedure - Optical Clarity Test - In this test a 7 inch piece of test material is mounted in a special holder that places the material 14 inches from the operator's eyes. The operator then views a standard eye chart through the test material mounted in the holder. The eye chart is initially located at a distance of 20 feet. Using the 20/20 vision line (line 8), the operator advances at one-foot increments until the 20/20 vision line is clearly visible. A clarity rating is then derived based on 20 feet equaling 100%. Each foot-increment decrease from the 20 foot (100%) distance reduces the optical clarity by 5%.

8.2 Acceptance Criteria - No acceptance criteria was established for optical properties as these requirements will vary depending upon the requirements of the user.

8.3 Results - The results of the light transparency and optical clarity tests are shown in Table 15 (pages 59 - 60).

9.0 HEAT SEALABILITY

In certain aerospace applications the ability to heat seal one piece of plastic to another is an important and necessary property of the plastic. Applications of this nature include packaging components and materials in plastic bags that are custom fabricated and sealed to provide an air tight clean environment. The ability to heat seal plastic also permits the fabrication of larger pieces of plastic film to make plastic blankets used to protect spacecraft and payloads from the environment. The information contained in this report on heat sealability was gathered directly from literature provided by the manufacturer or his distributor. For this test there is no pass or fail acceptance criteria established. The results of this investigation are shown in Table 16 (pages 61 - 62).

10.0 CONCLUSION

Based upon the test results contained in this report none of the materials tested satisfied all acceptance criteria (i.e., flammability, triboelectric, hypergolic compatibility, outgassing, and chemical compatibility). Several materials did, however, successfully satisfy all three KSC safety criteria. A complete summary of the test results is shown on page iv.

TABLE 1 - FLAMMABILITY (PIN SUPPORTED METHOD)

MATERIAL NAME	BURN LENGTH (INCHES)	BURN TIME (SECONDS)	PROPAGATION RATE (INCHES/ MINUTE)	Dриpping FLAMING PARTICLES	SELF EXTINGUISHED	PASS/FAIL
1. LECTROLITE DUOTONE	3.9	20	11.7	NO	YES	PASS
2. VELOSTAT	12.0	30	24.0	NO	NO	FAIL
3. RCAS 1200	12.0	35	20.6	YES	NO	FAIL
4. RCAS 2400	3.4	20	10.2	NO	YES	PASS
5. RCAS 3600	12.0	25	28.8	YES	NO	FAIL
6. RCAS 4200	12.0	25	28.8	YES	NO	FAIL
7. RCAS 4800	12.0	45	16.0	NO	NO	FAIL
8. PVC	12.0	7	102.8	NO	NO	FAIL
9. TRANS POLYETHYLENE	4.5	20	13.5	YES	YES	FAIL
10. BLACK POLYETHYLENE	12.0	20	36.0	YES	NO	FAIL
11. MP 1880 (0.010 IN)	5.8	37	9.4	YES	YES	FAIL
12. MP 1880 (0.015 IN)	5.3	70	4.5	YES	YES	FAIL
13. MP 1880 (0.020 IN)	3.0	35	5.1	YES	YES	FAIL
14. ACLAR 22A	2.0	20	6.0	NO	YES	PASS
15. ACLAR 33C	3.0	20	9.0	NO	YES	PASS
16. CONDULON GRID BAG	12.0	14	51.4	NO	NO	FAIL
17. PROPAFILM	7.0	20	21.0	NO	YES	FAIL
18. BALTARON 2007	4.8	20	14.4	NO	YES	PASS
19. GRIFFOLYN NYLON	4.0	20	12.0	YES	YES	FAIL
20. TX-300	6.5	20	19.5	YES	YES	PASS
21. TECKFILM	3.1	20	9.3	YES	YES	FAIL
22. MET. POLYESTER 50	4.9	20	14.7	NO	YES	PASS
23. MET. POLYESTER 100	4.7	20	14.1	NO	YES	PASS
24. MET. POLYESTER 200	4.2	20	12.6	NO	YES	PASS
25. KN-80	3.2	20	9.6	NO	YES	PASS

TABLE 1 CONTINUED - FLAMMABILITY (PIN SUPPORTED METHOD)

MATERIAL NAME	BURN LENGTH (INCHES)	BURN TIME (SECONDS)	PROPAGATION RATE (INCHES/ MINUTE)	DРИPPING FLAMING PARTICLES	SELF EXTINGUISHED	PASS/FAIL
26. AN-4C	5.1	20	15.3	NO	YES	PASS
27. AN-16	4.3	20	12.9	NO	YES	PASS
28. AN-18	4.2	20	12.6	NO	YES	PASS
29. AN-22	4.0	20	12.0	NO	YES	PASS
30. CRP PINK POLYETHYLENE	12.0	20	36.0	YES	NO	FAIL
31. CRP POLYPROPYLENE	5.0	20	15.0	YES	YES	PASS
32. CRP POLYETHYLENE	12.0	30	24.0	YES	NO	FAIL
33. CRP NYLON	4.5	20	13.5	NO	YES	PASS
34. CAPRAN 512	2.9	20	8.7	NO	YES	PASS
35. HERCULITE 80	5.0	20	15.0	NO	YES	PASS
36. AMERI-STAT	12.0	30	24.0	YES	NO	PASS
37. CAPRAN 980	4.5	20	13.5	NO	YES	PASS
38. FACILON 1412	10.0	37	16.2	NO	YES	FAIL
39. ST-500	12.0	30	24.0	YES	NO	PASS
40. ST-600	9.0	8	67.5	NO	NO	FAIL
41. ST-700	12.0	65	11.1	YES	NO	FAIL
42. ST-800	7.2	20	21.6	YES	YES	FAIL
43. GLASSCLEAR A	12.0	16	45.0	NO	NO	PASS
44. WRIGHTLON 4000A	4.0	20	12.0	NO	YES	PASS
45. WRIGHTLON 7000	3.5	20	10.5	NO	YES	PASS
46. SCHARR INDUSTRIES	6.0	13	27.7	YES	NO	FAIL
47. WRIGHTLON AS-3000	3.5	20	10.5	NO	YES	PASS

TABLE 1 CONTINUED - FLAMMABILITY (PIN SUPPORTED METHOD)

MATERIAL NAME	BURN LENGTH (INCHES)	BURN TIME (SECONDS)	PROPAGATION RATE (INCHES/MINUTE)	DРИPPING FLAMING PARTICLES	SELF EXTINGUISHED	PASS/FAIL
48. ALTAIR 20	4.5	20	13.5	NO	YES	PASS
49. CAPRAN 512-STATICURE	4.0	20	12.0	NO	YES	PASS
50. KAPTON LCL 1074	3.0	20	9.0	NO	YES	PASS
51. CFK-798	2.0	20	6.0	NO	YES	PASS
52. 3M 2100	12.0	40	18.0	YES	YES	FAIL
53. IPPLON 3W 900	3.0	20	9.0	NO	YES	PASS
54. SARAN 18L	4.0	20	12.0	NO	YES	PASS
56. IPPLON DP 1000	4.0	20	12.0	NO	YES	PASS
57. WRIGHTLON 7400	3.0	20	9.0	NO	YES	PASS
58. WRIGHTLON 8400	4.1	20	12.3	NO	YES	PASS
59. IPPLON 3W 1500	3.5	20	10.5	NO	YES	PASS

TABLE 2 - ELECTROSTATIC TEST DATA 30% RH

MATERIAL NAME	PEAK	VOLTAGE*					PASS/FAIL
		0.5 SEC	1.0 SEC.	2.0 SEC	3.0 SEC	4.0 SEC	
1. LECTROLITE DUOTONE	457	347	341	338	338	337	PASS
2. VELOSTAT	265	194	188	187	187	187	PASS
3. RCAS 1200	737	686	672	695	697	699	FAIL
4. RCAS 2400	6404	5630	4820	3971	3376	2903	FAIL
5. RCAS 3600	981	806	799	797	795	799	FAIL
6. RCAS 4200	413	355	353	350	360	346	PASS
7. RCAS 4800	392	259	259	258	259	268	PASS
8. PVC	-3453	-3253	-3230	-3257	-3220	-3189	FAIL
9. TRANS POLYETHYLENE	2566	1942	1942	1925	1926	1923	FAIL
10. BLACK POLYETHYLENE	2555	2291	2203	2140	2140	2124	FAIL
11. MP 1880 (0.010 IN)	15505	14388	14008	13435	12945	12555	FAIL
12. MP 1880 (0.015 IN)	14613	12548	12310	11945	11625	11343	FAIL
13. MP 1880 (0.020 IN)	5235	4035	3985	3948	3893	3868	FAIL
14. ACLAR 22A	-8375	-7885	-7843	-7808	-7830	-7819	FAIL
15. ACLAR 33C	-16293	-14371	-14312	-14090	-14050	-14002	FAIL
16. CONDULON GRID BAG	297	272	262	257	256	254	PASS
17. PROPAFILM	N	N	N	N	N	N	N
18. BALTARON 2007	-1583	-1324	-1340	-1358	-1366	-1373	FAIL
19. GRIFFOLYN NYLON	22680	22142	21940	21639	21356	21135	FAIL
20. TX-300	12263	10679	10641	10591	10483	10451	FAIL
21. TECKFILM	N	N	N	N	N	N	N
22. MET. POLYESTER 50	472	378	363	365	365	364	FAIL
23. MET. POLYESTER 100	497	383	360	353	348	346	PASS
24. MET. POLYESTER 200	5256	4797	4764	4723	4693	4673	FAIL
25. KN-8U							

* VOLTAGE REMAINING AT INDICATED TIMES FOLLOWING APPLICATION OF CHARGE

TABLE 2 CONTINUED - ELECTROSTATIC TEST DATA 30% RH

MATERIAL NAME	PEAK	VOLTAGE*					PASS/FAIL
		0.5 SEC	1.0 SEC	2.0 SEC	3.0 SEC	4.0 SEC	
26. AN-4C	331	272	273	272	272	272	PASS
27. AN-16	505	380	377	375	375	374	FAIL
28. AN-18	286	252	239	238	237	237	PASS
29. AN-22	274	223	221	220	218	218	PASS
30. CRP PINK POLYETHYLENE	276	171	156	148	151	150	PASS
31. CRP POLYPROPYLENE	16935	13445	13220	12950	12545	12380	FAIL
32. CRP POLYETHYLENE	13654	12264	12240	12208	12136	12118	FAIL
33. CRP NYLON	18713	17610	17398	17178	16990	16873	FAIL
34. CAPRAN 512	24309	22586	21405	19814	18661	17680	FAIL
35. HERCULITE 80	1542	290	234	236	235	235	PASS
36. AMERI-STAT	486	413	411	411	410	409	FAIL
37. CAPRAN 980	18328	16638	16423	16185	16007	15890	FAIL
38. FACILON 1412	18241	14626	6743	1925	761	416	PASS
39. ST-500	266	233	238	238	237	237	PASS
40. ST-600	416	234	233	233	232	232	PASS
41. ST-700	326	284	281	281	282	284	PASS
42. ST-800	277	159	158	158	161	160	PASS
43. GLASSCLEAR A	18573	12529	4475	923	374	267	PASS
44. WRIGHTLON 4000A	-10623	-9381	-9343	-9316	-9333	-9345	FAIL
45. WRIGHTLON 7000	7009	5761	5145	4318	3661	3140	FAIL
46. SCHARR INDUSTRIES	318	265	265	265	265	264	PASS
47. WRIGHTLON AS-3000	16051	11523	11208	10677	10158	9668	FAIL

* VOLTAGE REMAINING AT INDICATED TIMES FOLLOWING APPLICATION OF CHARGE

TABLE 2 CONTINUED - ELECTROSTATIC TEST DATA 30% RH

MATERIAL NAME	PEAK	VOLTAGE*					PASS/FAIL
		0.5 SEC	1.0 SEC	2.0 SEC	3.0 SEC	4.0 SEC	
48. ALTAIR 20	415	300	300	303	304	304	PASS
49. CAPRAN 512-STATICURE	8127	7065	6576	5755	5052	4456	FAIL
50. KAPTON LCL 1074	-14444	-11702	-11673	-11493	-11482	-11462	FAIL
51. CFK-798	-18900	-16132	-16027	-15970	-15927	-15886	FAIL
52. 3M 2100	361	276	266	264	263	263	PASS
53. IPPLON BW 900	4075	3395	2936	2289	1855	1561	FAIL
54. SARAN 18L	14729	14065	14045	14006	13979	13961	FAIL
56. IPPLON DP 1000	16444	13688	10402	6179	3833	2519	FAIL
57. WRIGHTLON 7400	18641	13689	12867	11640	10616	9686	FAIL
58. WRIGHTLON 8400	20233	17763	17156	16312	15658	15103	FAIL
59. IPPLON WN 1500	20782	18003	17205	16075	15161	14372	FAIL

* VOLTAGE REMAINING AT INDICATED TIMES FOLLOWING APPLICATION OF CHARGE

TABLE 3 - ELECTROSTATIC TEST DATA 45% RH

MATERIAL NAME	PEAK	VOLTAGE*					PASS/FAIL
		0.5 SEC	1.0 SEC	2.0 SEC	3.0 SEC	4.0 SEC	
1. LECTROLITE DUOTONE	233	176	175	177	177	178	175 PASS
2. VELOSTAT	184	145	151	152	160	157	158 PASS
3. RCAS 1200	242	198	195	205	205	192	205 PASS
4. RCAS 2400	4787	3045	1065	345	234	208	196 PASS
5. RCAS 3600	683	374	370	365	369	367	366 FAIL
6. RCAS 4200	141	108	106	104	102	100	99 PASS
7. RCAS 4800	213	144	142	141	140	139	138 PASS
8. PVC	6309	3018	2842	2669	2523	2483	2426 FAIL
9. TRANS POLYETHYLENE	1552	798	766	765	751	751	742 FAIL
10. BLACK POLYETHYLENE	2298	1861	1837	1821	1809	1797	1787 FAIL
11. MP 1880 (0.010 IN)	4111	3372	3182	2924	2767	2534	2359 FAIL
12. MP 1880 (0.015 IN)	5068	4069	3862	3527	3487	3032	2824 FAIL
13. MP 1880 (0.020 IN)	3819	3164	3086	2998	2932	2867	2808 FAIL
14. ACLAR 22A	-15888	-15612	-15520	-15367	-15217	-15083	-14941 FAIL
15. ACLAR 33C	-21424	-18374	-17992	-17754	-17588	-17402	-17270 FAIL
16. CONDULON GRID BAG	216	108	96	88	85	84	83 PASS
17. PROPAFFILM	N	N	N	N	N	N	N N
18. BALTARON 2007	-5168	-5047	-4988	-4893	-4829	-4780	-4740 FAIL
19. GRIFFOLYN NYLON	18643	17387	17045	16608	16249	15939	15650 FAIL
20. TX-300	12275	10753	10570	10474	10383	10298	10222 FAIL
21. TECKFILM	N	N	N	N	N	N	N N
22. MET. POLYESTER 50	202	124	123	124	124	125	125 PASS
23. MET. POLYESTER 100	184	126	127	128	128	129	129 PASS
24. MET. POLYESTER 200							
25. KN-80	6049	4537	4859	4593	4599	4577	4559 FAIL

* VOLTAGE REMAINING AT INDICATED TIMES FOLLOWING APPLICATION OF CHARGE

TABLE 3 CONTINUED - ELECTROSTATIC TEST DATA 45% RH

MATERIAL NAME	PEAK	VOLTAGE*					PASS/FAIL
		0.5 SEC	1.0 SEC	2.0 SEC	3.0 SEC	4.0 SEC	
26. AN-4C	177	130	130	132	131	130	PASS
27. AN-16	161	125	123	122	122	122	PASS
28. AN-18	342	252	243	239	238	237	PASS
29. AN-22	245	222	212	206	201	198	PASS
30. CRP PINK POLYETHYLENE	117	86	78	79	79	78	PASS
31. CRP POLYPROPYLENE	5095	3745	3705	3640	3600	3565	FAIL
32. CRP POLYETHYLENE	5558	5394	5330	5292	5268	5232	FAIL
33. CRP NYLON	5574	5306	5148	4942	4770	4620	FAIL
34. CAPRAN 512	17726	14632	12391	9286	7094	5615	FAIL
35. HERCULITE 80	10112	134	67	68	68	67	PASS
36. AMERI-STAT	297	248	244	241	239	238	PASS
37. CAPRAN 980	17862	16817	15650	14205	13230	12420	FAIL
38. FACILON 1412	15167	11383	5193	1444	574	334	PASS
39. ST-500	232	185	182	182	183	184	PASS
40. ST-600	211	6.1	0	0	0	0	PASS
41. ST-700							PASS
42. ST-800	227	156	158	158	158	156	PASS
43. GLASSCLEAR A	697	383	171	158	158	157	PASS
44. WRIGHTLON 4000A	-7745	-7324	-7333	-7299	-7253	-7236	FAIL
45. WRIGHTLON 7000	10423	6604	2112	611	373	278	PASS
46. SCHARR INDUSTRIES	305	255	255	256	256	267	PASS
47. WRIGHTLON AS-3000	1470	1202	756	433	380	343	PASS

* VOLTAGE REMAINING AT INDICATED TIMES FOLLOWING APPLICATION OF CHARGE

TABLE 3 CONTINUED - ELECTROSTATIC TEST DATA 45% RH

MATERIAL NAME	PEAK	VOLTAGE*					PASS/FAIL
		0.5 SEC	1.0 SEC	2.0 SEC	3.0 SEC	4.0 SEC	
48. ALTAIR 20	456	307	301	304	302	302	PASS
49. CAPRAN 512-STATICURE	9806	5285	1593	383	283	241	PASS
50. KAPTUN LCL 1074	-14892	-13826	-13604	-13294	-13133	-12964	FAIL
51. CFK-798	-11349	-6737	-6482	-6186	-5982	-5820	-12806
52. 3M 2100	318	224	223	223	223	224	FAIL
53. IPPLON BW 900	421	245	141	124	117	114	PASS
54. SARAN 18L	7797	7050	6975	6865	6745	6647	PASS
56. IPPLON DP 1000	3729	1233	373	205	156	140	FAIL
57. WRIGHTLON 7400	11334	7355	2753	757	468	368	6550
58. WRIGHTLON 8400	9542	7088	3502	1084	489	296	PASS
59. IPPLON WN 1500	9868	7194	3540	1125	530	327	PASS

* VOLTAGE REMAINING AT INDICATED TIMES FOLLOWING APPLICATION OF CHARGE

TABLE 4 - HYPERGOLIC COMPATIBILITY

MATERIAL NAME	N ₂ H ₄ TEMPERATURE RISE (°F)	NH ₃ H TEMPERATURE RISE (°F)	N2O4
1. LECTROLITE DUOTONE	PASS: TR-3.0	PASS: TR-1.2	PASS: WARP; WRINKLE; DISCOLORED
2. VELOSTAT	FAIL: TR-3.8	PASS: TR-1.0	PASS: NO APPARENT REACTIVITY
3. RCAS 1200	PASS: TR-4.0	PASS: TR-0.9	PASS: NO APPARENT REACTIVITY
4. RCAS 2400	PASS: TR-3.6	PASS: TR-0.6	FAIL: DISSOLVED
5. RCAS 3600	PASS: TR-3.3	PASS: TR-0.2	PASS: DISCOLORED
6. RCAS 4200	PASS: TR-3.9	PASS: TR-0.5	PASS: WARPED & DISCOLORED
7. RCAS 4800	PASS: TR-3.3	PASS: TR-0.7	PASS: WARPED & DISCOLORED
8. PVC	PASS TR-3.4	PASS: TR-1.1	PASS: WRINKLED & DISCOLORED
9. TRANS POLYETHYLENE	PASS: TR-3.7	PASS: TR-0.4	PASS: NO APPARENT REACTIVITY
10. BLACK POLYETHYLENE	PASS: TR-3.7	PASS: TR-0.7	PASS: NO APPARENT REACTIVITY
11. MP 1880 (0.010 IN)	N	N	N
12. MP 1880 (0.015 IN)	N	N	N
13. MP 1880 (0.020 IN)	N	N	N
14. ACLAR 22A	PASS: TR-4.0	PASS: TR-0.3	PASS: DISCOLORED
15. ACLAR 33C	PASS: TR-3.9	PASS: TR-0.1	PASS: NO APPARENT REACTIVITY
16. CONDULON GRID BAG	PASS: TR-3.4	PASS: TR-0.7	PASS: BUBBLED & DISCOLORED
17. PROPAFILM	N	N	N
18. BAL TARM 2007	PASS: TR-3.5	PASS: TR-1.0	PASS: DISCOLORED & DEFORMED
19. GRIFFOLYN NYLON	FAIL: TR-4.6	PASS: TR-0.8	PASS: DISCOLORED
20. TX-300	PASS: TR-3.8	PASS: TR-1.1	PASS: NO APPARENT REACTIVITY
21. TECKFILM	N	N	N
22. MET. POLYESTER 50	PASS: TR-3.4 REMOVED METAL	PASS: TR-0.8 REMOVED METAL	FAIL: BROKE THROUGH; DISCOLORED
23. MET. POLYESTER 100	PASS: TR-3.6 REMOVED METAL	PASS: TR-0.4 REMOVED METAL	FAIL: BROKE THROUGH; DISCOLORED
24. MET. POLYESTER 200			
25. KN-80	FAIL: TR-3.4 BROKE THROUGH	PASS: TR-0.9	PASS: DISCOLORED; DESTROYED FIBERS

TR - TEMPERATURE RISE
 N - NO MATERIAL TO TEST

TABLE 4 CONTINUED - HYPERGOLIC COMPATIBILITY CONTINUED

MATERIAL NAME	N ₂ H ₄ TEMPERATURE RISE (°F)	NMMH TEMPERATURE RISE (°F)	N ₂ O ₄
26. AN-4C	PASS: TR-4.5	PASS: TR-1.4 SEPARATED SEPARATED SEPARATED	PASS: DISCOLORED; DESTROYED FIBERS
27. AN-16	PASS: TR-2.4 DISCOLORED	PASS: TR-0.5 DISCOLORED SEPARATED	PASS: DISCOLORED; DESTROYED FIBERS
28. AN-18	PASS: TR-4.0 DISCOLORED	PASS: TR-0.9 DISCOLORED SEPARATED	PASS: DISCOLORED; DESTROYED FIBERS
29. AN-22	PASS: TR-4.3	PASS: TR-0.3	PASS: DISCOLORED; SEPARATED
30. CRP PINK POLYETHYLENE	PASS: TR-3.6	PASS: TR-0.6	PASS: DISCOLORED
31. CRP POLYPROPYLENE	PASS: TR-3.5	PASS: TR-0.7	PASS: NO APPARENT REACTIVITY
32. CRP POLYETHYLENE	PASS: TR-4.1	PASS: TR-1.0	PASS: NO APPARENT REACTIVITY
33. CRP NYLON	PASS: TR-4.3	PASS: TR-1.6	FAIL: DISSOLVED
34. CAPRAN 512	PASS: TR-4.3	PASS: TR-1.1	FAIL: DISSOLVED
35. HERCULITE 80	PASS: TR-4.4	PASS: TR-0.5 DISCOLORED	PASS: WRINKLED & DEFORMED
36. AMERI-STAT	PASS: TR-3.9 DISCOLORED	PASS: TR-1.2	PASS: SEPARATED & DISCOLORED
37. CAPRAN 980	PASS: TR-3.8	PASS: TR-0.9	FAIL: DISSOLVED
38. FACILON 1412	PASS: TR-3.7 DISCOLORED	PASS: TR-0.8 DISCOLORED	PASS: DISCOLORED & DEFORMED
39. ST-500	PASS: TR-3.5	PASS: TR-0.8	PASS: NO APPARENT REACTIVITY
40. ST-600	PASS: TR-3.5	PASS: TR-0.7	PASS: NO APPARENT REACTIVITY
41. ST-700	PASS: TR-3.0	PASS: TR-1.1	PASS: DISCOLORED; DULLED
42. ST-800	PASS: TR-3.7 DISCOLORED	PASS: TR-1.5 DISCOLORED	PASS: DISCOLORED; SEPARATED
43. GLASSCLEAR A	PASS: TR-3.8	PASS: TR-1.8	PASS: DISCOLORED & WARPED
44. WRIGHTLON 4000A	PASS: TR-4.2	PASS: TR-1.1	PASS: NO APPARENT REACTIVITY
45. WRIGHTLON 7000	PASS: TR-3.2	PASS: TR-0.5	PASS: DISSOLVED
46. SCHARR INDUSTRIES	PASS: TR-4.3	PASS: TR-0.8	PASS: DISCOLORED
47. WRIGHTLON AS-3000	PASS: TR-3.1	PASS: TR-1.1	PASS: DISSOLVED

TR - TEMPERATURE RISE
 N - NO MATERIAL TO TEST

TABLE 4 CONTINUED - HYPERGOLIC COMPATIBILITY CONTINUED

MATERIAL NAME	N2H4 TEMPERATURE RISE (°F)	MMH TEMPERATURE RISE (°F)	N2O4
48. ALTAIR 20	FAIL: TR-4.3 BROKE THROUGH	PASS: TR-0.9 DISCOLORED	FAIL: DISCLORED; BROKE THROUGH
49. CAPRAN 512-STATICURE	PASS: TR-3.1	PASS: TR-0.6	FAIL: DISSOLVED
50. KAPTON LCL 1074	FAIL: TR-4.4 BROKE THROUGH	PASS: TR-1.0 DISCOLORED	PASS: NO APPARENT REACTIVITY
51. CFK-798			
52. 3M 2100	PASS: TR-4.7 DISCOLORED	PASS: TR-1.4	PASS: DISCOLORED & SEPARATED
53. IPPLON BW 900	PASS: TR-3.8	PASS: TR-1.0	FAIL: DISSOLVED
54. SARAN 18L	PASS: TR-3.8 DISCOLORED	PASS: TR-1.4	PASS: DISCOLORED
56. IPPLON DP 1000	PASS: TR-4.2	PASS: TR-0.9	FAIL: DISSOLVED
57. WRIGHTLON 7400	PASS: TR-3.5	PASS: TR-1.7	FAIL: DISSOLVED
58. WRIGHTLON 8400	PASS: TR-4.1	PASS: TR-1.4	FAIL: DISSOLVED
59. IPPLON WN 1500	PASS: TR-4.2	PASS: TR-1.8	FAIL: DISSOLVED

TR - TEMPERATURE RISE

N - NO MATERIAL TO TEST

TABLE 5 - OUTGASSING

MATERIAL NAME	TML (%)	WVR (%)	CVCM (%)
1. LECTROLITE DUOTONE	13.31	0.06	8.65
2. VELOSTAT	0.98	0.27	0.02
3. RCAS 1200	0.67	0.00	0.30
4. RCAS 2400	4.28	2.27	0.11
5. RCAS 3600	0.39	0.01	0.16
6. RCAS 4200	0.36	0.03	0.11
7. RCAS 4800	0.33	0.02	0.10
8. PVC	25.80	0.02	18.98
9. TRANS POLYETHYLENE	0.41	0.00	0.17
10. BLACK POLYETHYLENE	0.29	0.00	0.13
11. MP 1880 (0.010 IN)	N	N	N
12. MP 1880 (0.015 IN)	N	N	N
13. MP 1880 (0.020 IN)	N	N	N
14. ACLAR 22A	0.12	0.02	0.01
15. ACLAR 33C	0.10	0.02	0.01
16. CONDULON GRID BAG	1.68	0.15	0.11
17. PROPAFILM	N	N	N
18. BALTARON 2007	4.84	0.03	0.97
19. GRIFFOLYN NYLON	1.97	0.14	0.20
20. TX-300	0.05	0.00	0.02
21. TECKFILM	N	N	N
22. MET. POLYESTER 50	0.17	0.04	0.02
23. MET. POLYESTER 100	0.16	0.05	0.01
24. MET. POLYESTER 200	0.17	0.05	0.02
25. KN-80	2.68	0.28	1.47
26. AN-4C	1.22	0.25	0.22
27. AN-16	2.48	0.27	0.76
28. AN-18	2.01	0.07	0.80
29. AN-22	2.97	0.46	0.69
30. CRP PINK POLYETHYLENE	0.53	0.00	0.33
31. CRP POLYPROPYLENE	0.24	0.00	0.15

TABLE 5 CONTINUED - OUTGASSING

MATERIAL NAME	TML (%)	WVR (%)	CVCM (%)
32. CRP POLYETHYLENE	0.21	0.00	0.06
33. CRP NYLON	3.42	2.37	0.05
34. CAPRAN 512	4.93	1.71	0.12
35. HERCULITE 80	26.85	0.20	8.40
36. AMERI-STAT	0.23	0.02	0.04
37. CAPRAN 980	3.40	2.39	0.05
38. FACILON 1412	26.16	0.07	6.42
39. ST-500	1.01	0.00	0.68
40. ST-600	0.78	0.08	0.35
41. ST-700	0.40	0.04	0.11
42. ST-800	0.60	0.02	0.11
43. GLASSCLEAR A	15.68	0.03	9.09
44. WRIGHTLON 4000A	0.02	0.01	0.01
45. WRIGHTLON 7000	4.49	2.61	0.15
46. SCHARR INDUSTRIES	0.25	0.03	0.06
47. WRIGHTLON AS-3000	5.64	2.31	0.13
48. ALTAIR 20	0.24	0.13	0.01
49. CAPRAN 512-STATICURE	4.93	1.71	0.12
50. KAPTON LCL 1074	N	N	N
51. CFK-798	N	N	N
52. 3M 2100	0.42	0.07	0.09
53. IPPLON BW 900	4.71	3.41	0.13
54. SARAN 18L	4.25	2.08	0.16
56. IPPLON DP 1000	3.99	1.89	0.20
57. WRIGHTLON 7400	4.07	2.97	0.18
58. WRIGHTLON 8400	2.88	1.58	0.19
59. IPPLON WN 1500	2.98	1.65	0.21

TABLE 6 - 5-MINUTE EXPOSURE, SOLVENTS

MATERIAL NAME	CONTROL STRENGTH (PSI)	BREAK STRAIN (%)	FREON 113 STRENGTH (PSI)	BREAK STRAIN (%)	ISOPROPYL ALCOHOL STRENGTH (PSI)	BREAK STRAIN (%)	METHYL ETHYL KETONE STRENGTH (PSI)	BREAK STRAIN (%)	DISSOLVED	DISSOLVED
1. LECTROLITE DUOTONE*	55	100	55	100	65	100	2100	190	2100	200
2. VELOSTAT	2130	230	2100	210	2100	410	1980	410	1980	410
3. RCAS 1200	2090	460	1770	350	2100	410	10410	260	10410	260
4. RCAS 2400	9380	230	8460	230	9350	290				
5. RCAS 3600	4820	25	3590	20	5160	25	4760	25	4760	25
6. RCAS 4200	9900	30	8590	45	8280	40	8330	30	8330	30
7. RCAS 4800	9390	40	9600	40	9110	35	8260	35	8260	35
8. PVC	3920	210	3330	140	3490	160				
9. TRANS POLYETHYLENE	2070	300	2230	370	2150	330	1970	240	1970	240
10. BLACK POLYETHYLENE	1990	390	2130	380	1970	380	1910	330	1910	330
11. MP 1880 (0.010 IN)	N	N	N	N	N	N	N	N	N	N
12. MP 1880 (0.015 IN)	N	N	N	N	N	N	N	N	N	N
13. MP 1880 (0.020 IN)	N	N	N	N	N	N	N	N	N	N
14. ACLAR 22A	4460	50	4350	75	4490	125	4340	120	4340	120
15. ACLAR 33C	6030	45	6160	20	6200	25	5970	50	5970	50
16. CONDULON GRID BAG	2980	220	3210	270	3190	260	3210	250	3210	250
17. PROPAFILM	N	N	N	N	N	N	N	N	N	N
18. BALTARON 2007	3000	10	4780	6.0	4250	8.0				
19. GRIFFOLYN NYLON*	8.0	330	7.0	824	20	430	6.0	340	6.0	340

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 6 CONTINUED - 5-MINUTE EXPOSURE, SOLVENTS

MATERIAL NAME	CONTROL STRENGTH (PSI)	BREAK STRAIN (%)	FREUN STRENGTH (PSI)	BREAK STRAIN (%)	ISOPROPYL ALCOHOL STRENGTH (PSI)	BREAK STRAIN (%)	METHYL ETHYL KETONE STRENGTH (PSI)	BREAK STRAIN (%)
20. TX-300	15820	45	14440	50	21970	25	11800	50
21. TECKFILM	N	N	N	N	N	N	N	N
22. MET. POLYESTER 50	15410	25	15080	20	15390	20	15600	20
23. MET. POLYESTER 100	19450	20	18750	20	15960	20	19270	20
24. MET. POLYESTER 200	23560	30	21630	25	22380	25	20960	20
25. KN-80*	30	45	25	30	20	20	25	30
26. AN-4C*	10	30	10	20	10	25	10	30
27. AN-16*	25	25	20	30	20	30	20	35
28. AN-18*	15	30	10	25	10	30	10	35
29. AN-22*	50	30	35	40	40	35	30	30
30. CRP PINK POLYETHYLENE	1480	180	1690	320	1640	280	1740	360
31. CRP POLYPROPYLENE	3710	65	N	N	4010	10	N	N
32. CRP POLYETHYLENE	1650	190	N	N	1560	270	1630	250
33. CRP NYLON	4860	100	N	N	6560	220	8960	275
34. CAPRAN 512	7880	200	11080	290	8090	270	5520	180
35. HERCULITE 80*	200	40	210	30	150	50	DISSOLVED	DISSOLVED
36. AMERI-STAT	4790	30	4480	30	4550	25	4310	30
37. CAPRAN 980	11160	290	9880	290	6690	220	10900	280
38. FACILON 1412*	150	40	160	30	140	70	DISSOLVED	DISSOLVED
39. ST-500	2020	380	2000	390	1930	330	1740	380

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 6 CONTINUED - 5-MINUTE EXPOSURE, SOLVENTS

MATERIAL NAME	CONTROL STRENGTH (PSI)	BREAK STRAIN (%)	FREON 113 STRENGTH (PSI)	BREAK STRAIN (%)	ISOPROPYL ALCOHOL STRENGTH (PSI)	BREAK STRAIN (%)	METHYL ETHYL KETONE STRENGTH (PSI)	BREAK STRAIN (%)
40. ST-600	2820	340	2650	300	2720	340	2570	300
41. ST-700	2190	320	2230	260	1980	250	2290	360
42. ST-800	9170	25	9040	25	9560	30	9750	25
43. GLASSCLEAR A	3750	160	2940	100	3170	90	1870	260
44. WRIGHTLON 4000A	3420	140	3870	130	3900	160	3040	140
45. WRIGHTLON 7000	11800	260	13790	240	10100	250	12420	290
46. SCHARR INDUSTRIES	7660	20	7630	35	7470	20	8040	25
47. WRIGHTLON AS-3000	8860	180	11910	240	11020	250	12450	300
48. ALTAIR 20	21870	30	20310	25	23790	25	23230	25
49. CAPRAN 512-STATICURE	7590	180	8510	220	5950	190	7280	190
50. KAPTON LCL 1074	23360	30	22890	25	22410	25	22530	20
51. CFK-798*	70	10	65	7.0	55	4.0	55	10
52. 3M 2100	8660	30	9300	30	7260	40	10860	30
53. IPPLON BW 900	9220	280	9960	280	10110	330	9250	360
54. SARAN 18L	6930	20	7460	25	8590	30	6660	30
56. IPPLON DP 1000	8050	220	12200	170	9350	370	7510	310
57. WRIGHTLON 7400	11200	330	8490	380	9630	380	9260	270
58. WRIGHTLON 8400	8010	80	6810	250	8310	200	8550	230
59. WN 1500 (IPPLON)	10080	230	10110	120	10380	240	10400	240

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 7 - 5-MINUTE EXPOSURE, FUELS

MATERIAL NAME	A - 50 STRENGTH (PSI)			HYDRAZINE STRENGTH (PSI)			MONOMETHYL HYDRAZINE STRENGTH (PSI)			UNISYMMETRICAL DIMETHYL HYDRAZINE STRENGTH (PSI)		DISSOLVED DISSOLVED
	BREAK STRAIN (%)	BREAK STRAIN (%)	STRAIN (%)	BREAK STRAIN (%)	BREAK STRAIN (%)	STRAIN (%)	STRAIN (%)	STRAIN (%)	STRAIN (%)	2150	220	
1. LECTROLITE WUOTONE*	40	110	50	100	2160	60	35	250	250	1840	400	DISSOLVED
2. VELOSTAT	2210	230	2140	230	2080	450	25190	170	5040	6000	5380	125
3. RCAS 1200	2310	480	1840	400	25190	170	5040	20	5040	5380	5380	25
4. RCAS 2400	8560	220	6580	130	7160	25	7160	25	7160	7810	7810	25
5. RCAS 3600	4620	20	4480	20	7480	20	7480	20	7480	9290	9290	35
6. RCAS 4200	7160	30	6730	25	4220	40	4220	40	4220	3610	3610	35
7. RCAS 4800	7690	40	6300	20	190	290	190	290	190	2080	2080	320
8. PVC	4340	165	3000	165	330	320	1960	320	1960	1980	1980	370
9. TRANS POLYETHYLENE	2110	370	1710	190	2080	290	2080	290	2080	2080	2080	N
10. BLACK POLYETHYLENE	1790	350	1730	330	1960	320	1960	320	1960	1980	1980	N
11. MP 1880 (0.010 IN)	N	N	N	N	N	N	N	N	N	N	N	N
12. MP 1880 (0.015 IN)	N	N	N	N	N	N	N	N	N	N	N	N
13. MP 1880 (0.020 IN)	N	N	N	N	N	N	N	N	N	N	N	N
14. ACLAR 22A	4880	120	4240	65	4540	120	4540	120	4540	4080	4080	35
15. ACLAR 33C	6350	15	6380	30	6420	50	6420	50	6420	5750	5750	25
16. CONDULON GRID BAG	3490	240	3030	220	2780	200	2780	200	2780	3470	3470	240
17. PROPAFILM	N	N	N	N	N	N	N	N	N	N	N	DISSOLVED
18. BALTARON 2007	3360	35	4950	5.0	5670	20	5670	20	5670	DISSOLVED	DISSOLVED	DISSOLVED
19. GRIFOLYN NYLON*	9.0	420	8.0	340	9.0	180	9.0	180	9.0	8.0	8.0	340

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 7 CONTINUED - 5-MINUTE EXPOSURE, FUELS

MATERIAL NAME	A - 50 STRENGTH (PSI)		HYDRAZINE STRENGTH (PSI)		MONOMETHYL HYDRAZINE STRENGTH (PSI)		UNSYMMETRICAL DIMETHYL HYDRAZINE STRENGTH (PSI)	
	BREAK STRAIN (%)	STRAIN (%)	BREAK STRAIN (%)	STRAIN (%)	BREAK STRAIN (%)	STRAIN (%)	BREAK STRAIN (%)	STRAIN (%)
20. TX-300	21210	20	20810	25	15810	20	9500	25
21. TECK FILM	N	N	N	N	N	N	N	N
22. MET. POLYESTER	50	14090	15	12540	20	15270	15	14940
23. MET. POLYESTER	100	10620	15	11450	10	15870	20	19950
24. MET. POLYESTER	200	21300	20	19790	25	14910	20	20070
25. KN-80*		DISS	DISS	DISS	DISS	DISS	20	20
26. AN-4C*		DISS	DISS	8.0	60	8.0	25	30
27. AN-16*		DISS	DISS	15	85	20	25	25
28. AN-18*		DISS	DISS	7.0	50	7.0	60	10
29. AN-22*	40	35	30	20	40	40	25	35
30. CRP PINK POLYETHYLENE	1700	220	1340	260	1410	175	1700	360
31. CRP POLYPROPYLENE	4060	7.0	4630	380	3550	30	3930	190
32. CRP POLYETHYLENE	1590	90	1670	250	1700	240	1600	210
33. CRP NYLON	5590	65	5020	100	4770	95	5130	90
34. CAPRAN 512	7480	200	6040	160	4710	130	8560	220
35. HERCULITE 80*	200	40	180	60	170	45	70	80
36. AMERI-STAT	4520	20	3710	20	4390	30	4300	25
37. CAPRAN 980	9180	250	5300	460	4950	160	6780	190
38. FACILON 1412*	110	45	100	65	145	50	130	70
39. ST-500		1950	320	1530	280	1510	160	1720

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102
 FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 7 CONTINUED - 5-MINUTE EXPOSURE FUELS

MATERIAL NAME	A - 50 STRENGTH (PSI)	50 BREAK STRAIN (%)	HYDRAZINE			MONOMETHYL HYDRAZINE			UNSYMMETRICAL DIMETHYL HYDRAZINE		
			STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)
40. ST-60U	2730	290	2320	320	2130	260	2630	260	2300	2630	330
41. ST-70U	2380	350	1880	380	2010	270	2300	270	2300	2300	370
42. ST-800	9270	25	7230	70	7780	17	8730	17	8730	8730	25
43. GLASSCLEAR A	2950	95	3060	150	3020	75	3040	75	3040	3040	30
44. WRIGHTLON 4000A	4060	140	2510	150	2240	110	2760	110	2760	2760	170
45. WRIGHTLON 7000	14860	290	7710	220	5910	130	8720	130	8720	8720	210
46. SCHARR INDUSTRIES	7830	25	7590	25	7560	20	7190	20	7190	7190	20
47. WRIGHTLON AS-3000	11800	270	10060	200	9140	200	10720	200	10720	10720	210
48. ALTAIR 20	20550	25	16740	20	18940	25	18500	25	18500	18500	25
49. CAPRAN 512-STATICUR	6560	160	6120	140	5410	130	5640	130	5640	5640	130
50. KAPTON LCL 1074	DISS	DISS	DISS	DISS	6290	15	18310	15	18310	18310	13
51. CFK-798*	70	7.0	45	6.0	75	40	50	40	50	50	13
52. 3M 2100	9180	30	N	N	N	N	10550	N	10550	10550	30
53. IPPLON BW 900	9910	310	DISS	DISS	7970	250	4810	250	4810	4810	240
54. SARAN 18L	5260	13	N	N	9720	282	5820	282	5820	5820	20
56. IPPLON DP 1000	11460	330	DISS	DISS	4770	140	12210	140	12210	12210	400
57. WRIGHTLON 7400	7850	280	DISS	DISS	7680	230	10350	230	10350	10350	300
58. WRIGHTLON 8400	6710	150	DISS	DISS	6730	140	7040	140	7040	7040	130
59. IPPLON WN 1500	9790	250	DISS	DISS	6600	65	6838	65	6838	6838	115

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 8 - 5-MINUTE EXPOSURE, OXIDANTS

MATERIAL NAME	NITRIC ACID STRENGTH (PSI)	NITRIC ACID BREAK STRAIN (%)	NITROGEN TETOXIDE STRENGTH (PSI)	NITROGEN TETOXIDE BREAK STRAIN (%)
1. ELECTROLITE DUOTONE*	50	110	35	110
2. VELOSTAT	2240	230	2170	200
3. RCAS 1200	2080	400	2300	450
4. RCAS 2400	DISS	DISS	DISS	DISS
5. RCAS 3600	4750	20	4080	20
6. RCAS 4200	6960	25	1650	180
7. RCAS 4800	7360	30	2290	195
8. PVC	4210	175	6130	25
9. TRANS POLYETHYLENE	2510	380	2120	320
10. BLACK POLYETHYLENE	1570	210	1800	340
11. MP 1880 (0.010 IN)	N	N	N	N
12. MP 1880 (0.015 IN)	N	N	N	N
13. MP 1880 (0.020 IN)	N	N	N	N
14. ACLAR 22A	4890	120	4470	50
15. ACLAR 33C	6550	40	6170	50
16. CONDULON GRID BAG	1590	430	1830	390
17. PROPAFILM	N	N	N	N
18. BALTARON 2007	N	N	4470	30
19. GRIFFOLYN NYLON*	8.0	360	8.0	520

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 8 CONTINUED - 5-MINUTE EXPOSURE, OXIDANTS

MATERIAL NAME	NITRIC ACID STRENGTH (PSI)	NITRIC ACID BREAK STRAIN (%)	NITROGEN TETROXIDE STRENGTH (PSI)	NITROGEN TETROXIDE BREAK STRAIN (%)
20. TX-30U	N	N	10980	40
21. TECKFILM	N	N	N	N
22. MET. POLYESTER 50	6710	15	DISS	DISS
23. MET. POLYESTER 10U	13770	20	DISS	DISS
24. MET. POLYESTER 200	17950	20	DISS	DISS
25. KN-80*	DISS	DISS	9.0	6.0
26. AN-4C*	DISS	DISS	6.0	50
27. AN-16*	DISS	DISS	5.0	75
28. AN-18*	DISS	DISS	5.0	50
29. AN-22*	20	35	10	125
30. CRP PINK POLYETHYLENE	N	N	1750	250
31. CRP POLYPROPYLENE	N	N	3640	20
32. CRP POLYETHYLENE	N	N	1890	370
33. CRP NYLON	N	N	DISS	DISS
34. CAPRAN 512	DISS	DISS	DISS	DISS
35. HERCULITE 80*	200	145	20	120
36. AMERI-STAT	3810	30	1430	310
37. CAPRAN 980	DISS	DISS	DISS	DISS
38. FACILON 1412*	180	35	30	50
39. ST-500	N	N	2080	340

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 8 CONTINUED - 5-MINUTE EXPOSURE, OXIDANTS

MATERIAL NAME	NITRIC ACID STRENGTH (PSI)	BREAK STRAIN (%)	NITROGEN STRENGTH (PSI)	TETROXIDE BREAK STRAIN (%)
40. ST-600	2740	340	2670	370
41. ST-700	2460	330	2240	340
42. ST-800	6760	25	1590	240
43. GLASSCLEAR A	3150	125	5440	15
44. WRIGHTLON 4000A	N	DISS	3530	140
45. WRIGHTLON 7000	DISS	DISS	DISS	DISS
46. SCHARR INDUSTRIES	6850	25	1150	20
47. WRIGHTLON AS-3000	DISS	DISS	DISS	DISS
48. ALTAIR 20	17990	30	DISS	DISS
49. CAPRAN 512-STATICURE	DISS	DISS	DISS	DISS
50. KAPTON LCL 1074	18680	15	4170	4.0
51. CFK-798*	N	N	60	15
52. 3M 2100	7450	35	1360	340
53. IPPILON BW 900	DISS	DISS	DISS	DISS
54. SARAN 18L	8640	20	N	N
56. IPPILON DP 1000	DISS	DISS	DISS	DISS
57. WRIGHTLON 7400	DISS	DISS	DISS	DISS
58. WRIGHTLON 8400	DISS	DISS	DISS	DISS
59. IPPILON WN 1500	DISS	DISS	DISS	DISS

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 9 - 5-MINUTE EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	SODIUM HYDROXIDE (25%)		CITRIC ACID (14 - 17%)		HYDROCHLORIC ACID (35%)	
	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)
1. LECTROLITE DUOTONE*	40	70	60	65	50	65
2. VELOSTAT	2220	230	2170	220	2120	210
3. RCAS 1200	1800	360	1790	350	2110	440
4. RCAS 2400	7450	225	7130	160	DISS	DISS
5. RCAS 3600	3970	20	4790	25	4860	25
6. RCAS 4200	7840	25	7710	25	8180	30
7. RCAS 4800	9350	40	9100	35	9700	45
8. PVC	3700	175	3220	180	3630	190
9. TRANS POLYETHYLENE	2330	350	2220	370	1850	290
10. BLACK POLYETHYLENE	2160	380	2150	390	1940	350
11. MP 1880 (0.010 IN)	N	N	N	N	N	N
12. MP 1880 (0.015 IN)	N	N	N	N	N	N
13. MP 1880 (0.020 IN)	N	N	N	N	N	N
14. ACLAR 22A	4580	90	4630	110	4420	90
15. ACLAR 33C	6510	30	6080	40	6490	45
16. CONDULON GRID BAG	3670	270	3330	300	1860	440
17. PROPAFILM	N	N	N	N	N	N
18. BALTARON 2007	N	N	N	N	N	N
19. GRIFOLYN NYLON*	8.0	300	8.0	90	9.0	480

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 9 CONTINUED - 5-MINUTE EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	SODIUM HYDROXIDE (25%) -		CITRIC ACID (14 - 17%)		HYDROCHLORIC ACID (35%)	
	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)
20. TX-300	17390	25	11230	40	19520	20
21. TECKFILM	N	N	N	N	N	N
22. MET. POLYESTER 50	15540	15	15910	25	15540	20
23. MET. POLYESTER 100	19310	20	19440	20	21040	20
24. MET. POLYESTER 200	24540	25	22010	30	26230	30
25. KN-80*	20	25	20	20	20	15
26. AN-4C*	9.0	35	10	30	5.0	60
27. AN-16*	DISS	DISS	20	20	4.0	50
28. AN-18*	10	20	10	25	5.0	30
29. AN-22*	DISS	DISS	35	30	30	25
30. CRP PINK POLYETHYLENE	1710	240	1790	360	1380	190
31. CRP POLYPROPYLENE	N	N	N	N	N	N
32. CRP POLYETHYLENE	N	N	N	N	N	N
33. CRP NYLON	N	N	N	N	N	N
34. CAPRAN 512	6520	165	7240	180	DISS	DISS
35. HERCULITE 80*	130	50	170	75	185	110
36. AMERI-STAT	4460	25	4150	20	4680	25
37. CAPRAN 980	8480	220	6730	150	DISS	DISS
38. FACILON 1412*	150	60	150	90	175	60
39. ST-500	1790	280	2070	360	2140	420

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 9 CONTINUED - 5-MINUTE EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	SODIUM HYDROXIDE (25%)		CITRIC ACID (14 - 17%)		HYDROCHLORIC ACID (35%)	
	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)
40. ST-600	2580	270	2710	330	2350	260
41. ST-700	2490	340	2500	340	2820	360
42. ST-800	10300	35	11270	30	9600	30
43. GLASSCLEAR A	3130	110	3200	120	2980	95
44. WRIGHTLON 400UA	4960	175	2870	130	3630	150
45. WRIGHTLON 700U	13230	250	14970	270	DISS	DISS
46. SCHARR INDUSTRIES	7610	20	8600	30	7840	25
47. WRIGHTLON AS-3000	10400	280	11460	240	DISS	DISS
48. ALTAIR 20	19360	20	19930	20	21190	30
49. CAPRAN 512-STATICURE	6510	175	6440	165	DISS	DISS
50. KAPTON LCL 1074	21020	30	24380	25	22660	25
51. CFK-798*	65	6.0	65	9.0	70	8.0
52. 3M 2100	9390	30	10670	35	7510	40
53. IPPLON BW 900	8500	270	7520	200	DISS	DISS
54. SARAN 18L	7810	25	9390	25	7840	25
56. IPPLON DP 1000	11400	320	11260	330	DISS	DISS
57. WRIGHTLON 7400	11650	320	9340	240	DISS	DISS
58. WRIGHTLON 8400	7390	65	6750	80	DISS	DISS
59. IPPLON WN 1500	7940	130	11610	270	DISS	DISS

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 9A - 5-MINUTE EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	HYDRAULIC FLUID MIL-H-5606		HYDRAULIC FLUID MIL-H-83282		STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	ANHYDROUS AMMONIA STRENGTH (PSI)	BREAK STRAIN (%)
	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)						
1. LECTROLITE DUOTUNE*	55	95	52	95					37	95
2. VELOSTAT	2240	280	1930	220					2088	203
3. RCAS 1200	1730	380	2060	430					1879	371
4. RCAS 2400	6980	150	6350	145					5912	124
5. RCAS 3600	4710	25	4780	25					4572	20
6. RCAS 4200	8130	30	8080	25					8879	45
7. RCAS 4800	8960	40	9120	40					7948	28
8. PVC	3450	225	3750	195					3411	164
9. TRANS POLYETHYLENE	1830	235	1610	210					2145	373
10. BLACK POLYETHYLENE	1700	320	1560	300					1854	378
11. MP 1880 (0.010 IN)	N	N	N	N					N	N
12. MP 1880 (0.015 IN)	N	N	N	N					N	N
13. MP 1880 (0.020 IN)	N	N	N	N					N	N
14. ACLAR 22A	4410	65	4450	130					4443	104
15. ACLAR 33C	6150	30	5480	25					6173	32
16. CONDULON GRID BAG	3030	220	2750	195					3163	226
17. PRUPAFILM	N	N	N	N					N	N
18. BALTARON 2007	N	N	N	N					N	N
19. GRIFFULYN NYLON*	7.0	380	7.0	360					7.0	519

N = NO MATERIAL TO TEST

* = TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 9A CONTINUED - 5-MINUTE EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	HYDRAULIC FLUID MIL-H-5606	HYDRAULIC FLUID MIL-H-83282	ANHYDROUS AMMONIA STRENGTH (PSI)	ANHYDROUS AMMONIA BREAK STRAIN (%)	ANHYDROUS AMMONIA STRENGTH (PSI)	ANHYDROUS AMMONIA BREAK STRAIN (%)
20. TX-300	N	N	N	N	N	N
21. TECKFILM	N	15750	20	14630	15	14327
22. MET. POLYESTER 50	19150	15	18650	15	19080	18
23. MET. POLYESTER 100	23450	25	25150	25	22443	20
24. MET. POLYESTER 200	25	40	25	40	8.0	19
25. KN-80*	10	30	10	30	10	78
26. AN-4C*	20	20	20	20	21	84
27. AN-16*	10	25	10	25	11	75
28. AN-18*	30	30	30	30	40	60
29. AN-22*	30	30	30	30	N	N
30. CRP PINK POLYETHYLENE	N	N	N	N	N	N
31. CRP POLYPROPYLENE	N	N	N	N	N	N
32. CRP POLYETHYLENE	N	N	N	N	N	N
33. CRP NYLON	8570	210	8700	250	6111	133
34. CAPRAN 512	185	40	185	35	188	95
35. HERCULITE 80*	5470	40	4550	25	4440	24
36. AMERI-STAT	5380	130	10000	260	8940	227
37. CAPRAN 980	170	40	170	40	142	106
38. FACILON 1412*	N	N	N	N	1799	380
39. ST-500						

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102
FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 9A CONTINUED - 5-MINUTE EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	HYDRAULIC FLUID MIL-H-5606	STRENGTH BREAK (PSI)	STRAIN (%)	HYDRAULIC FLUID MIL-H-83282	STRENGTH BREAK (PSI)	STRAIN (%)	HYDRAULIC FLUID	ANHYDROUS AMMONIA STRENGTH BREAK (PSI)	ANHYDROUS AMMONIA STRENGTH BREAK STRAIN (%)
40. ST-600	2450	320		2180	310		2168	272	
41. ST-700	1850	260		2040	310		2245	368	
42. ST-800	N	N		N	N		7647	26	
43. GLASSCLEAR A	2960	110		2940	120		3023	106	
44. WRIGHTLON 4000A	N	N		N	N		N	N	
45. WRIGHTLON 7000	12840	220		12400	250		10551	186	
46. SCHARR INDUSTRIES	9030	40		7620	20		6765	17	
47. WRIGHTLON AS-3000	8380	175		9220	210		8674	178	
48. ALTAIR 20	24350	30		22670	25		17570	20	
49. CAPRAN 512-STATICURE	6270	180		6650	220		5500	69	
50. KAPTON LCL 1074	23770	25		21550	20		8626	5.9	
51. CFK-798*	N	N		N	N		77	14	
52. 3M 2100	11030	30		7060	35		8514	27	
53. IPPON BM 900	8320	230		8450	290		7815	232	
54. SARAN 18L	6820	20		6830	20		7806	21	
56. IPPON DP 1000	12080	320		11180	310		9285	299	
57. WRIGHTLON 7400	8270	235		8060	180		9495	290	
58. WRIGHTLON 8400	8060	60		6200	45		7657	59	
59. IPPON WN 1500	7710	200		8470	190		7657	192	

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 10 - 1-HOUR EXPOSURE, SOLVENTS

MATERIAL NAME	CONTROL STRENGTH (PSI)	BREAK STRAIN (%)	FREON 113 STRENGTH (PSI)	BREAK STRAIN (%)	ISOPROPYL ALCOHOL STRENGTH (PSI)	BREAK STRAIN (%)	METHYL ETHYL KETONE STRENGTH (PSI)	BREAK STRAIN (%)
1. LECTRULITE DUOTONE*	55	100	55	100	65	110	DISS	DISS
2. VELOSTAT	2130	230	2020	220	2130	210	2160	210
3. RCAS 1200	2090	460	1850	230	2020	380	1880	410
4. RCAS 2400	9380	230	7100	180	8790	260	6460	190
5. RCAS 3600	4820	25	4970	25	4060	25	4870	20
6. RCAS 4200	9900	30	3580	30	7290	30	8410	45
7. RCAS 4800	9390	40	9030	50	8360	40	9310	45
8. PVC	3920	210	3890	110	2980	160	DISS	DISS
9. TRANS POLYETHYLENE	2070	300	2310	340	2030	320	2120	320
10. BLACK POLYETHYLENE	1990	390	1820	310	1960	380	1790	300
11. MP 1880 (J.010 IN)	N	N	N	N	N	N	N	N
12. MP 1880 (J.015 IN)	N	N	N	N	N	N	N	N
13. MP 1880 (J.020 IN)	N	N	N	N	N	N	N	N
14. ACLAR 22A	4460	50	4560	250	4770	130	4450	150
15. ACLAR 33C	6030	45	5950	20	6130	20	6130	50
16. CONDULON GRID BAG	2980	220	3190	260	2790	250	2550	200
17. PROPAFILM	N	N	N	N	N	N	N	N
18. BALTAON 2007	3000	10	4250	7.0	2930	10	DISS	DISS
19. GRIFFOLYN NYLON*	8.0	330	8.0	400	25	360	10	330

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 10 CONTINUED - 1-HOUR EXPOSURE, SOLVENTS

MATERIAL NAME	CONTROL STRENGTH (PSI)	BREAK STRAIN (%)	FREON 113 STRENGTH (PSI)	BREAK STRAIN (%)	ISOPROPYL ALCOHOL STRENGTH (PSI)	BREAK STRAIN (%)	METHYL ETHYL KETONE STRENGTH (PSI)	BREAK STRAIN (%)
20. TX-300	15820	45	13320	40	12530	30	17340	25
21. TECK FILM	N	N	N	N	N	N	N	N
22. MET. POLYESTER 50	15410	25	15290	15	16130	30	16080	30
23. MET. POLYESTER 100	19450	20	18440	15	18650	20	19390	20
24. MET. POLYESTER 200	23560	30	21980	25	22310	30	22290	25
25. KN-80*	30	45	25	25	25	30	20	30
26. AN-4C*	10	30	10	25	10	35	10	30
27. AN-16*	25	20	20	30	20	35	15	30
28. AN-18*	15	30	10	35	10	30	10	40
29. AN-22*	50	30	35	30	40	30	35	35
30. CRP PINK POLYETHYLENE	1480	180	1520	310	1530	220	1530	230
31. CRP POLYPROPYLENE	3710	65	N	N	3400	20	N	N
32. CRP POLYETHYLENE	1650	190	N	N	1520	330	1420	230
33. CRP NYLON	4860	100	8320	230	5490	190	6810	180
34. CAPRAN 512	7880	200	10720	320	4950	170	9370	280
35. HERCULITE 80*	200	40	200	40	115	110	DISS	DISS
36. AMERI-STAT	4790	30	4700	30	4500	25	4600	30
37. CAPRAN 980	11160	290	9740	260	6870	220	7510	230
38. FACILON 1412*	150	40	170	40	160	90	DISS	DISS
39. ST-500	2020	380	2020	390	1830	320	1760	340

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 10 CONTINUED - 1-HOUR EXPOSURE, SOLVENTS

MATERIAL NAME	CONTROL STRENGTH (PSI)	BREAK STRAIN (%)	FREUN STRENGTH (PSI)	BREAK STRAIN (%)	ISOPROPYL ALCOHOL STRENGTH (PSI)	BREAK STRAIN (%)	METHYL ETHYL KETONE STRENGTH (PSI)	BREAK STRAIN (%)
40. ST-600	2820	340	2710	310	2460	270	2460	380
41. ST-700	2190	320	2310	320	2480	380	2730	360
42. ST-800	9170	25	8070	30	8320	30	8900	25
43. GLASSCLEAR A	3750	160	3080	100	2870	85	2490	290
44. WRIGHTLON 4000A	3420	140	2980	120	3160	150	3180	120
45. WRIGHTLON 7000	11800	260	12030	210	14580	320	15230	350
46. SCHARR INDUSTRIES	7660	20	7210	25	8270	30	8090	35
47. WRIGHTLON AS-3000	8860	180	11460	160	10230	260	11040	230
48. ALTAIR 20	21870	30	21510	25	21720	25	21260	25
49. CAPRAN 512-STATICURE	7590	180	8850	130	7050	200	4790	150
50. KAPTON LCL 1074	23360	30	22380	20	21470	25	21570	25
51. CFK-798*	70	10	70	7.0	75	10	55	10
52. 3M 2100	8660	30	9590	30	7260	30	9960	40
53. IPPLON BW 900	9220	280	9700	290	8270	360	8050	340
54. SARAN 18L	6930	20	7410	30	7610	25	6930	30
56. IPPLON DP 1000	8050	220	10880	310	7730	360	10490	440
57. WRIGHTLON 7400	11200	330	10130	300	8610	330	10370	330
58. WRIGHTLON 8400	8010	80	7750	130	8020	230	8500	210
59. IPPLON WN 1500	10080	230	9100	190	10060	220	10020	260

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 11 - 1-HOUR EXPOSURE, FUELS

MATERIAL NAME	A - 50 STRENGTH (PSI)		HYDRAZINE STRENGTH (PSI)		MONOMETHYLHYDRAZINE STRENGTH (PSI)		UNSYMMETRICAL DIMETHYL HYDRAZINE STRENGTH (PSI)	
	BREAK STRAIN (%)	STRAIN (%)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)
1. LECTROLITE DUOTUNE*	20	280	50	120	40	35	DISS	DISS
2. VELOSTAT	2140	200	2160	210	2160	230	2130	220
3. RCAS 1200	1810	380	1980	430	1860	330	2150	430
4. RCAS 2400	7120	180	6150	140	6370	140	7090	170
5. RCAS 3600	4800	20	4460	20	4650	20	4530	20
6. RCAS 4200	1840	300	1200	200	4650	10	6910	20
7. RCAS 4800	2350	210	1380	330	5750	15	8870	35
8. PVC	3310	160	3630	175	6440	10	2530	170
9. TRANS POLYETHYLENE	1700	210	1920	240	2080	240	2240	330
10. BLACK POLYETHYLENE	1730	290	1690	275	2010	350	2010	390
11. MP 1880 (0.010 IN)	N	N	N	N	N	N	N	N
12. MP 1880 (0.015 IN)	N	N	N	N	N	N	N	N
13. MP 1880 (0.020 IN)	N	N	N	N	N	N	N	N
14. ACLAR 22A	4840	95	4620	85	4470	70	2970	30
15. ACLAR 33C	6280	20	5970	30	6360	30	6200	25
16. CONDULON GRID BAG	3200	220	2820	200	2270	140	2080	140
17. PROPAFILM	N	N	N	N	N	N	N	N
18. BALTAIRON 2007	4040	17	4640	6.0	3950	25	DISS	DISS
19. GRIFFOLYN NYLON*	8.0	290	8.0	220	8.0	160	7.0	600

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 11 CONTINUED - 1-HOUR EXPOSURE, FUELS

MATERIAL NAME	A - 50 STRENGTH (PSI)	BREAK STRAIN (%)	HYDRAZINE STRENGTH (PSI)	BREAK STRAIN (%)	MONOMETHYL HYDRAZINE STRENGTH (PSI)	BREAK STRAIN (%)	UNSYMMETRICAL DIMETHYL HYDRAZINE STRENGTH (PSI)	BREAK STRAIN (%)
20. TX-300	24360	30 N	14490	30 N	15790	30 N	12210	45 N
21. TECKFILM	N	DISS	DISS	DISS	3150	7.0	14440	15
22. POLYESTER 50	DISS	DISS	DISS	DISS	10540	8.0	15460	20
23. POLYESTER 100	DISS	25	DISS	DISS	20640	20	22600	20
24. POLYESTER 200	16490	DISS	DISS	DISS	DISS	DISS	15	15
25. KN-80*	DISS	DISS	DISS	4.0	50	4.0	15	10
26. AN-4C*	DISS	DISS	DISS	4.0	60	6.0	25	25
27. AN-16*	DISS	DISS	DISS	5.0	50	5.0	30	10
28. AN-18*	40	35	15	80	35	30	35	25
29. AN-22*								
30. CRP PINK POLYETHYLENE	1620	180	1430	250	1480	175	1490	330
31. CRP POLYPROPYLENE	3600	6.0	3360	230	3780	250	2500	250
32. CRP POLYETHYLENE	1670	370	4850	140	1570	320	1020	270
33. CRP NYLON	5030	90	5370	110	5010	120	4960	90
34. CAPRAN 512	9440	250	5980	135	5870	160	8700	220
35. HERCULITE 80*	210	40	150	70	170	45	80	80
36. AMERI-STAT	1990	370	3090	310	3710	15	3980	25
37. CAPRAN 980	6110	180	5950	160	4300	25	8920	230
38. FACILON 1412*	50	130	40	90	140	35	70	50
39. ST-500	1880	340	1480	110	1750	230	1970	370

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 11 CONTINUED - 1-HOUR, EXPOSURE FUELS

MATERIAL NAME	A - 50 STRENGTH (PSI)		HYDRAZINE STRENGTH (PSI)		MONOMETHYLHYDRAZINE (MMH) STRENGTH (PSI)		UNSYMMETRICAL DIMETHYL HYDRAZINE STRENGTH (PSI)	
	STRAIN (%)	BREAK STRAIN (%)	STRAIN (%)	BREAK STRAIN (%)	STRAIN (%)	BREAK STRAIN (%)	STRAIN (%)	BREAK STRAIN (%)
40. ST-600	2840	330	1430	300	2070	290	2740	320
41. ST-700	2600	340	2030	280	1400	260	2460	350
42. ST-800	3380	8.0	1500	140	8070	15	7810	30
43. GLASSCLEAR A	3010	120	2950	120	4310	25	3020	25
44. WRIGHTLON 4000A	4380	160	2560	150	2380	100	2930	110
45. WRIGHTLON 7000	12160	240	8070	240	7510	180	10910	260
46. SCHARR INDUSTRIES	2630	410	1340	320	7420	20	7460	25
47. WRIGHTLON AS-3000	12230	270	6840	120	5990	130	8050	170
48. ALTAIR 20	8880	15	DISS	DISS	2029U	25	21810	30
49. CAPRAN 512-STATICURE	6740	170	7490	200	5210	55	5270	130
50. KAPTON LCL 1074	DISS	DISS	DISS	DISS	DISS	DISS	17070	13
51. CFK-798*	75	10	70	4.0	55	15	70	8.0
52. 3M 2100	1440	280	N	N	N	N	8230	35
53. IPPLON BW 900	8160	260	N	N	6890	220	9740	280
54. SARAN 18L	5800	12	N	N	5680	156	6110	13
56. IPPLON DP 1000	8080	260	N	N	4880	160	11970	410
57. WRIGHTLON 7400	10020	310	N	N	6540	180	10660	290
58. WRIGHTLON 8400	7160	80	N	N	6190	50	6720	115
59. IPPLON MN 1500	9020	220	N	N	6250	60	7850	200

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102
 FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 12 - 1-HOUR EXPOSURE, OXIDANTS

MATERIAL NAME	NITRIC ACID STRENGTH (PSI)	NITRIC ACID BREAK STRAIN (%)	NITROGEN TETOXIDE STRENGTH (PSI)	NITROGEN TETOXIDE BREAK STRAIN (%)
1. LECTROLITE DUOTUNE*	30	250	25	160
2. VELUSTAT	2230	240	2050	190
3. RCAS 1200	2180	460	2070	400
4. RCAS 2400	DISS	DISS	DISS	DISS
5. RCAS 3600	3560	20	DISS	DISS
6. RCAS 4200	6870	30	1760	410
7. RCAS 4800	7120	35	2270	110
8. PVC	4550	160	6030	20
9. TRANS POLYETHYLENE	2420	340	2100	300
10. BLACK POLYETHYLENE	1990	320	2020	390
11. MP 1880 (0.010 IN)	N	N	N	N
12. MP 1880 (0.015 IN)	N	N	N	N
13. MP 1880 (0.020 IN)	N	N	N	N
14. ACLAR 22A	4690	120	5030	25
15. ACLAR 33C	6690	55	6400	45
16. CONDULON GRID BAG	1790	350	1920	320
17. PROPAFILM	N	N	N	N
18. BALTARON 2007	N	N	2690	80
19. GRIFFOLYN NYLON*	8.0	480	8.0	400

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 12 CONTINUED - 1-HOUR EXPOSURE, OXIDANTS

MATERIAL NAME	NITRIC ACID STRENGTH (PSI)	BREAK STRAIN (%)	NITROGEN TETOXIDE STRENGTH (PSI)	BREAK STRAIN (%)
20. TX-300	N	N	7980	10
21. TECKFILM	N	N	N	N
22. MET. POLYESTER 50	6640	13	DISS	DISS
23. MET. POLYESTER 100	16780	20	DISS	DISS
24. MET. POLYESTER 200	18220	30	DISS	DISS
25. KN-80*	DISS	DISS	1.0	4.0
26. AN-4C*	DISS	DISS	5.0	75
27. AN-16*	DISS	DISS	4.0	40
28. AN-18*	DISS	DISS	3.0	25
29. AN-22*	10	70	10	135
30. CRP PINK POLYETHYLENE	N	N	1810	260
31. CRP POLYPROPYLENE	N	N	3640	30
32. CRP POLYETHYLENE	N	N	1940	430
33. CRP NYLON	N	N	DISS	DISS
34. CAPRAN 512	DISS	DISS	DISS	DISS
35. HERCULITE 80*	45	130	35	4.0
36. AMERI-STAT	3700	50	1430	340
37. CAPRAN 98U	DISS	DISS	DISS	DISS
38. FACILION 1412*	145	45	40	10
39. ST-500	N	N	1820	270

N = NO MATERIAL TO TEST

* = TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 12 CONTINUED - 1-HOUR EXPOSURE, OXIDANTS CONTINUED

MATERIAL NAME	NITRIC ACID STRENGTH (PSI)	BREAK STRAIN (%)	NITROGEN TETOXIDE STRENGTH (PSI)	BREAK STRAIN (%)
40. ST-600	2590	330	2840	360
41. ST-700	1890	210	2480	380
42. ST-800	7050	25	1530	150
43. GLASSCLEAR A	3070	120	5010	25
44. WRIGHTLON 4000A	N		3370	135
45. WRIGHTLON 7000	DISS	DISS	DISS	DISS
46. SCHARR INDUSTRIES	6130	30	1330	230
47. WRIGHTLON AS-3000	DISS	DISS	DISS	DISS
48. ALTAIR 20	14800	25	DISS	DISS
49. CAPRAN 512-STATICURE	DISS	DISS	DISS	DISS
50. KAPTON LCL 1074	17760	20	DISS	DISS
51. CFK-798*	40	10	35	15
52. 3M 2100	6500	25	1480	390
53. IPPLON BW 900	DISS	DISS	DISS	DISS
54. SARAN 18L	7440	20	N	Y
56. IPPLON DP 1000	DISS	DISS	DISS	DISS
57. WRIGHTLON 7400	DISS	DISS	DISS	DISS
58. WRIGHTLON 8400	DISS	DISS	DISS	DISS
59. WN 1500 (IPPLON)	DISS	DISS	DISS	DISS

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 13 - 1-HOUR EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	SODIUM HYDROXIDE (25%)		CITRIC ACID (14 - 17%)		HYDROCHLORIC ACID (35%)	
	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)
1. LECTROLITE DUOTONE*	50	75	55	70	55	80
2. VELOSTAT	2120	210	2160	220	2180	225
3. RCAS 1200	1930	410	2020	440	2180	460
4. RCAS 2400	6090	135	6370	55	DISS	DISS
5. RCAS 3600	3880	17	4700	20	4280	20
6. RCAS 4200	8160	30	8280	40	7420	25
7. RCAS 4800	9090	40	7270	25	8330	35
8. PVC	3730	145	3300	200	3910	180
9. TRANS POLYETHYLENE	2200	310	2650	350	1200	240
10. BLACK POLYETHYLENE	1730	250	1960	380	1900	370
11. MP 1880 (0.010 IN)	N	N	N	N	N	N
12. MP 1880 (0.015 IN)	N	N	N	N	N	N
13. MP 1880 (0.020 IN)	N	N	N	N	N	N
14. ACLAR 22A	4670	90	4480	120	4730	120
15. ACLAR 33C	6480	55	6440	645	5810	25
16. CONDULON GRID BAG	3380	240	2930	250	1710	320
17. PROPAFILM	N	N	N	N	N	N
18. BALTRON 2007	N	N	N	N	N	N
19. GRIFFOLYN NYLON*	8.0	8.0	8.0	90	8.0	540

N = NO MATERIAL TO TEST

* = TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 13 CONTINUED - 1-HOUR EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	SODIUM HYDROXIDE (25%)		CITRIC ACID (14 - 17%)		HYDROCHLORIC ACID (35%)	
	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)
20. TX-300	11660	40	23220	20	24560	30
21. TECKFILM	N	N	N	N	N	N
22. MET. POLYESTER 50	15140	20	15160	15	14550	15
23. MET. POLYESTER 100	19370	20	22850	20	21140	20
24. MET. POLYESTER 200	25140	25	26170	25	26450	35
25. KN-80*	7.0	15	20	20	17	25
26. AN-4C*	DISS	DISS	10	20	5.0	35
27. AN-16*	DISS	DISS	20	25	5.0	50
28. AN-18*	DISS	DISS	10	25	4.0	20
29. AN-22*	DISS	DISS	40	30	20	15
30. CRP PINK POLYETHYLENE	1470	125	1720	230	1550	220
31. CRP POLYPROPYLENE	N	N	N	N	N	N
32. CRP POLYETHYLENE	N	N	N	N	N	N
33. CRP NYLON	N	N	N	N	N	N
34. CAPRAN 512	5580	160	6270	160	DISS	DISS
35. HERCULITE 80*	130	65	180	70	120	55
36. AMERI-STAT	4400	20	4430	30	4440	25
37. CAPRAN 980	7190	180	7160	170	DISS	DISS
38. FACILJN 1412*	150	30	15b	55	140	60
39. ST-500	2020	400	2040	380	1940	380

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 13 CONTINUED - 1-HOUR EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	SODIUM HYDROXIDE (25%) STRENGTH (PSI)	BREAK STRAIN (%)	CITRIC ACID (14 - 17%) STRENGTH (PSI)	BREAK STRAIN (%)	HYDROCHLORIC ACID (35%) STRENGTH (PSI)	BREAK STRAIN (%)
40. ST-600	2600	280	2820	310	2640	280
41. ST-700	2420	310	2560	290	2380	380
42. ST-800	9510	25	10440	25	6840	25
43. GLASSCLEAR A	2980	120	3030	110	3300	110
44. WRIGHTLON 400UA	3310	135	3930	130	3030	65
45. WRIGHTLON 700U	13550	260	11750	190	DISS	DISS
46. SCHARR INDUSTRIES	8660	35	8230	25	8210	30
47. WRIGHTLON AS-3000	9110	200	11400	200	DISS	DISS
48. ALTAIR 20	22870	30	21300	20	18150	25
49. CAPRAN 512-STATICURE	5530	120	5810	140	DISS	DISS
50. KAPTUN LCL 1074	20280	25	22810	25	23260	25
51. CFK-798*	55	5.0	65	10	65	8.0
52. 3M 2100	10910	30	10600	45	9220	35
53. IPPLON BW 900	7120	215	8810	240	DISS	DISS
54. SARAN 18L	9100	25	9650	30	6970	20
56. IPPLON DP 1000	10340	300	9750	280	DISS	DISS
57. WRIGHTLON 7400	10080	290	9420	250	DISS	DISS
58. WRIGHTLON 8400	6920	90	7450	115	DISS	DISS
59. IPPLON WN 1500	9560	215	8200	180	DISS	DISS

N = NO MATERIAL TO TEST

* = TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 13A - 1-HOUR EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	HYDRAULIC FLUID MIL-H-5606 STRENGTH (PSI)	HYDRAULIC FLUID MIL-H-83282 STRENGTH (PSI)	HYDRAULIC FLUID MIL-H-83282 BREAK STRAIN (%)	ANHYDROUS AMMONIA STRENGTH (PSI)	ANHYDROUS AMMONIA BREAK STRAIN (%)
1. LECTROLITE DUOTONE*	55	100	52	110	58
2. VELOSTAT	2060	250	1910	220	2129
3. RCAS 1200	1680	400	1730	350	1839
4. RCAS 2400	6430	135	7470	200	6643
5. RCAS 3600	4480	20	5040	20	4589
6. RCAS 4200	7590	35	8250	30	7569
7. RCAS 4800	8510	50	8640	50	8453
8. PVC	3580	175	3250	175	3274
9. TRANS POLYETHYLENE	1790	250	1490	165	2012
10. BLACK POLYETHYLENE	1450	220	1630	340	1763
11. MP 1880 (0.010 IN)	N	N	N	N	N
12. MP 1880 (0.015 IN)	N	N	N	N	N
13. MP 1880 (0.020 IN)	N	N	N	N	N
14. ACLAR 22A	4450	90	4380	90	4405
15. ACLAR 33C	6390	70	6060	15	5916
16. CONDULON GRID BAG	3450	25	2770	175	2519
17. PROPAFILM	N	N	N	N	120
18. BALTARON 2007	N	N	N	N	28
19. GRIFFOLYN NYLON*	7.0	420	7.0	320	182
					503
					8.0

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 13A CONTINUED - 1-HOUR EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	HYDRAULIC FLUID MIL-H-5606			HYDRAULIC FLUID MIL-H-83282			ANHYDROUS AMMONIA		
	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)
20. TX-300	N	N	N	N	N	N	N	N	N
21. TECKFILM	N	N	15620	20	14860	10	11062	29	
22. MET. POLYESTER 50	15620		19570	20	18760	15	14567	13	
23. MET. POLYESTER 100			24840	25	24490	30	21870	21	
24. MET. POLYESTER 200	24840								
25. KN-80*	25	35		25	35		3.0	93	
26. AN-4C*	10	30		10	30		10	93	
27. AN-16*	15	20		15	20		19	93	
28. AN-18*	10	30		10	30		11	70	
29. AN-22*	30	30		30	30		41	61	
30. CRP PINK POLYETHYLENE	N	N		N	N		N	N	
31. CRP POLYPROPYLENE	N	N		N	N		N	N	
32. CRP POLYETHYLENE	N	N		N	N		N	N	
33. CRP NYLON	N	N		N	N		N	N	
34. CAPRAN 512	8660	225		3110	250		5940	146	
35. HERCULITE 80*	185	40		185	40		188	93	
36. AMERI-STAT	4950	35		4590	25		3906	44	
37. CAPRAN 980	8440	190		7600	200		5043	169	
38. FACILON 1412*	175	40		175	40		131	80	
39. ST-500	N	N		N	N		1806	322	

N = NO MATERIAL TO TEST

* = TEST PERFORMED PER FTM 191 METHOD 5102

FTM 191 = TEST GIVEN IN LBS/INCH OF WIDTH

TABLE 13A CONTINUED - 1-HOUR EXPOSURE, MISCELLANEOUS CHEMICALS

MATERIAL NAME	HYDRAULIC FLUID MIL-H-5606		HYDRAULIC FLUID MIL-H-83282		ANHYDROUS AMMONIA STRENGTH BREAK STRAIN (%)	
	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	BREAK STRAIN (%)	STRENGTH (PSI)	STRAIN (%)
40. ST-600	1980	350	2120	340	2149	296
41. ST-700	1660	225	2150	340	2189	360
42. ST-800	N	N	N	N	7433	23
43. GLASSCLEAR A	3080	120	3060	115	2954	101
44. WRIGHTLON 4000A	N	N	N	N	N	N
45. WRIGHTLON 7000	13500	240	11560	220	11707	188
46. SCHARR INDUSTRIES	6980	20	7560	20	7979	30
47. WRIGHTLON AS-3000	11740	235	8910	200	6740	107
48. ALTAIR 20	23680	25	20310	20	19873	27
49. CAPRAN 512-STATICURE	9620	275	5240	135	5444	76
50. KAPTON LCL 1074	21200	20	19820	15		
51. CFK-798*	N	N	N	N	64	17
52. 3M 2100	12300	50	8960	25	6629	37
53. IPPLON BW 900	3080	225	7790	240	5940	160
54. SARAN 18L	7650	25	7860	25	7658	20
56. IPPLON DP 1000	10990	320	11320	235	8830	258
57. WRIGHTLON 7400	8800	270	11330	330	8385	236
58. WRIGHTLON 8400	6580	70	7990	55	7362	83
59. IPPLON WN 1500	9400	250	8850	170	7645	47

N - NO MATERIAL TO TEST

* - TEST PERFORMED PER FTM 191 METHOD 5102

FIGURES ARE GIVEN IN LBS/INCH OF WIDTH

TABLE 14 - SPENCER IMPACT TEST

MATERIAL NAME	IMPACT STRENGTH (PSI)
1. LECTROLITE DUOTONE	> 3441
2. VELOSTAT	3545
3. RCAS 1200	2914
4. RCAS 2400	> 22368
5. RCAS 3600	> 4474
6. RCAS 4200	> 14912
7. RCAS 4800	> 14912
8. PVC	9216
9. TRANS POLYETHYLENE	3226
10. BLACK POLYETHYLENE	2917
11. MP 1880 (0.010 IN)	> 4067
12. MP 1880 (0.015 IN)	> 2796
13. MP 1880 (0.020 IN)	> 2237
14. ACLAR 22A	> 8947
15. ACLAR 33C	3042
16. CONDULON GRID BAG	6196
17. PROPAFILM	N
18. BALTARON 2007	1074
19. GRIFFOLYN NYLON	4149
20. TX-300	> 14912
21. TECKFILM	N
22. MET. POLYESTER 50	34447
23. MET. POLYESTER 100	35521
24. MET. POLYESTER 200	> 22368
25. KN-80	> 11184
26. AN-4C	1857
27. AN-16	1913
28. AN-18	1085

-> - EXCEEDS THE GIVEN NUMBER STRENGTH

N - NO MATERIAL TO TEST

TABLE 14 CONTINUED - SPENCER IMPACT TEST

MATERIAL NAME	IMPACT STRENGTH (PSI)
29. AN-22	> 4971
30. CRP PINK POLYETHYLENE	2759
31. CRP POLYPROPYLENE	1467
32. CRP POLYETHYLENE	2982
33. CRP NYLON	> 22368
34. CAPRAN 512	> 22368
35. HERCULITE 80	> 4474
36. AMERI-STAT	> 11184
37. CAPRAN 980	> 22368
38. FACILON 1412	> 2237
39. ST-500	3162
40. ST-600	6084
41. ST-700	5473
42. ST-800	> 14912
43. GLASSCLEAR A	> 4474
44. WRIGHTLON 4000A	27021
45. WRIGHTLON 7000	> 22368
46. SCHARR INDUSTRIES	> 14912
47. WRIGHTLON AS-3000	> 22368
48. ALTAIR	> 22368
49. CAPRAN 512-STATICURE	> 22368
50. KAPTON LCL 1074	> 22368
51. CFK-798	> 8947
52. 3M 2100	> 14912
53. IPPLON BW 900	> 22368
54. SARAN 18L	> 22368

> - EXCEEDS THE GIVEN NUMBER STRENGTH

N - NO MATERIAL TO TEST

TABLE 14 CONTINUED - SPENCER IMPACT TEST

MATERIAL NAME	IMPACT STRENGTH (PSI)
56. IPPLON DP 1000	> 22368
57. WRIGHTLON 7400	> 22368
58. WRIGHTLON 8400	> 22368
59. IPPLON WN 1500	> 22368

> - EXCEEDS THE GIVEN NUMBER STRENGTH

N - NO MATERIAL TO TEST

TABLE 15 - LIGHT TRANSPARENCY AND OPTICAL CLARITY

MATERIAL NAME	TRANSPARENCY (%)	CLARITY (%)
1. LECTROLITE DUOTONE	0	0
2. VELOSTAT	0	0
3. RCAS 1200	80	95
4. RCAS 2400	85	100
5. RCAS 3600	0	0
6. RCAS 4200	55	45
7. RCAS 4800	65	70
8. PVC	95	100
9. TRANS POLYETHYLENE	85	25
10. BLACK POLYETHYLENE	0	0
11. MP 1880 (0.010 IN)	95	100
12. MP 1880 (0.015 IN)	95	100
13. MP 1880 (0.020 IN)	94	100
14. ACLAR 22A	95	100
15. ACLAR 33C	95	100
16. CONDULON GRID BAG	65	25
17. PROPAFILM	N	N
18. BALTARON 2007	90	5
19. GRIFFOLYN NYLON	15	0
20. TX-300	92	100
21. TECKFILM	80	N
22. MET. POLYESTER 50	0	95
23. MET. POLYESTER 100	40	100
24. MET. POLYESTER 200	0	0
25. KN-80	55	65
26. AN-4C	0	0
27. AN-16	0	0
28. AN-18	0	0
29. AN-22	0	0
30. CRP PINK POLYETHYLENE	75	10
31. CRP POLYPROPYLENE	95	100

TABLE 15 CONTINUED - LIGHT TRANSPARENCY AND OPTICAL CLARITY

MATERIAL NAME	TRANSPARENCY (%)	CLARITY (%)
32. CRP POLYETHYLENE	85	85
33. CRP NYLON	90	100
34. CAPRAN 512	91	85
35. HERCULITE 80	0	0
36. AMERI-STAT	40	90
37. CAPRAN 980	90	100
38. FACILON 1412	0	0
39. ST-500	80	85
40. ST-600	0	0
41. ST-700	25	20
42. ST-800	45	50
43. GLASSCLEAR A	75	0
44. WRIGHTLON 4000A	65	100
45. WRIGHTLON 7000	80	100
46. SCHARR INDUSTRIES	52	75
47. WRIGHTLON AS-3000	85	100
48. ALTAIR 20	87	100
49. CAPRAN 512-STATICURE	90	35
50. KAPTON LCL 1074	55	100
51. CFK-798	6	0
52. 3M 2100	36	75
53. IPPLON BW 900	84	95
54. SARAN 18L	93	100
56. IPPLON DP 1000	81	95
57. WRIGHTLON 7400	81	70
58. WRIGHTLON 8400	77	100
59. IPPLON WN 1500	74	95

TABLE 16 - HEAT SEALIBILITY

MATERIAL NAME	HEAT SEALABLE
1. LECTROLITE DUOTONE	YES
2. VELOSTAT	YES
3. RCAS 1200	YES
4. RCAS 2400	YES
5. RCAS 3600	YES
6. RCAS 4200	YES
7. RCAS 4800	YES
8. PVC	YES
9. TRANS POLYETHYLENE	YES
10. BLACK POLYETHYLENE	YES
11. MP 1880 (0.010 IN)	YES
12. MP 1880 (0.015 IN)	YES
13. MP 1880 (0.020 IN)	YES
14. ACLAR 22A	YES
15. ACLAR 33C	YES
16. CONDULON GRID BAG	YES
17. PROPAFILM	YES
18. BALTARON 2007	YES
19. GRIFFOLYN NYLON	YES
20. TX-300	NO
21. TECKFILM	NO
22. MET. POLYESTER 50	YES
23. MET. POLYESTER 100	YES
24. MET. POLYESTER 200	YES
25. KN-80	YES
26. AN-4C	NO
27. AN-16	YES
28. AN-18	YES
29. AN-22	YES
30. CRP PINK POLYETHYLENE	YES
31. CRP POLYPROPYLENE	YES

TABLE 16 CONTINUED - HEAT SEALIBILITY

MATERIAL NAME	HEAT SEALABLE
32. CRP POLYETHYLENE	YES
33. CRP NYLON	YES
34. CAPRAN 512	YES
35. HERCULITE 80	YES
36. AMERI-STAT	YES
37. CAPRAN 980	YES
38. FACILON 1412	YES
39. ST-500	YES
40. ST-600	YES
41. ST-700	YES
42. ST-800	YES
43. GLASSCLEAR A	YES
44. WRIGHTLON 4000A	YES
45. WRIGHTLON 7000	YES
46. SCHARR INDUSTRIES	YES
47. WRIGHTLON AS-3000	YES
48. ALTAIR 20	YES
49. CAPRAN 512-STATICURE	YES
50. KAPTON LCL 1074	NO
51. CFK-798	YES
52. 3M 2100	YES
53. IPPLON BW 900	YES
54. SARAN 18L	YES
56. IPPLON DP 1000	YES
57. WRIGHTLON 7400	YES
58. WRIGHTLON 8400	YES
59. IPPLON WN 1500	YES

APPENDIX A

MANUFACTURERS OF MATERIALS TESTED
COMPANY NAMES AND ADDRESSES

LECTROLITE DUOTONE; HERCULITE 80
HERCULITE FABRICS
HERCULITE PRODUCTS, INC.
1107 BROADWAY; SUITE 612
NEW YORK, NY 10010
(212) 691-7550

VELOSTAT; TYPE 2100
3M COMPANY
3M CENTER
ST. PAUL, MN 55144
(612) 733-1110

RCAS 1200; 2400; 3600; 4200; 4800
RICHMOND DIVISION
DIXICO, INC.
COLTON & OPAL STS.
P. O. BOX 1129
REDLANDS, CA 92373
(714) 794-2111

TRANSPARENT & BLACK POLYETHYLENE
CHICAGO TRANSPARENT PRODUCTS
2702 N. PAULINE ST.
CHICAGO, IL 60614
(312) 281-3040

MP 1880 (.010", .015", .020")
J.P. STEVENS & CO.
ELASTOMERIC PRODUCTS DEPT.
81 THOMAS ST.
EASTHAMPTON, MA 01027
(413) 527-0700

ACLAR 22A; ACLAR 33C; CAPRAN 512; 980; 512 STATICURE
ALLIED PLASTICS & FUNCTIONAL CHEMICALS DIVISION
COLUMBIA ROAD & PARK AVENUE
BOX 2332R
MORRISTOWN, NJ 07960
(201) 455-2000

CONDULON CONDUCTIVE GRID BAG
SEALED AIR CORP
OLD SHERMAN TPKE.
DANBURY, CT 06810
(203) 792-2360

PROPAFILM C135
ICI AMERICAS, INC.
P.O. BOX 751
WILMINGTON, DE 19899
(302) 575-3000

BALTARUN 2007
GENERAL TIRE & RUBBER CO.
PLASTIC FILM CO.
ONE GENERAL ST.
NEWCOMERSTOWN, OH 43832
(614) 498-5900

GRIFFOLYN NYLON DIVISION
REEF INDUSTRIES, INC.
P.O. BOX 33248-TR
HOUSTON, TX 77233
(713) 943-0070

TX-300
TREA INDUSTRIES
560-T OLD BAPTIST ROAD
NORTH KINGSTON, RI 02852
(401) 294-4511

TECKFILM (70-00117)
TECHNIT CORP (EMI SHIELDING DIV)
320 NORTH NOPAL ST.
SANTA BARBARA, CA 93103
(805) 963-5811

50, 100 AND 200 GAUGE METALLIZED POLYESTER
MARTIN PROCESSING, INC., FILM GROUP
P. O. BOX 5068-T
MARTINSVILLE, VA 24112
(703) 629-1711

KN-80; AN-4C; AN-16; AN-18; AN-22
ORCON CORP.
33430 WESTERN AVE.
UNION CITY, CA 94587
(415) 489-8100

CRP PINK POLYETHYLENE; POLYPROPYLENE; NATURAL POLYETHYLENE; NYLON
CLEAN ROOM PRODUCTS, INC.
56-T PENATAQUIT AVE.
BAYSHORE, NY 11706
(516) 968-8282

AMERI-STAT
AMERICAN CONVERTORS, INC.
2705 N.E. UNIVERSITY AVE.
MINNEAPOLIS, MN 55418
(312) 866-4600

FACILON 1412
SUN CHEMICAL CORP., CHEMICALS DIVISION
P. O. BOX 70
CHESTER, SC 29706
(803) 385-5181

ST-500; 600; 700; 800
STAR-TEX CORP.
8233 220TH ST.
LAKEVILLE, MN 55044
(800) 328-4080

GLASSCLEAR A/S
RENEER FILMS
P. O. BOX 40
AUBURN, PA 17922
(717) 366-1051

WRIGHTLON 4000A; 7000; 7400; 8400; AS-3000;
IPPLON DP 1000; WN 1500; BW900
INTERNAITON PLASTICS PRODUCTS, INC.
P. O. BOX 6246
2546 EAST DEL AMO BLVD.
CARSON, CA 90749
(213) 603-9666

CONDUCTIVE TRANSPARENT PACKAGING FILM
SCHARR INDUSTRIES, INC.
40 E NEWBERRY ROAD
BLOOMFIELD, CT 06002
(203) 243-0343

ALTAIR 20
SOUTHWELL TECHNOLOGIES
1029 CORPORATION PKWY.
PALO ALTO, CA 94303
(415) 962-9111

SARAN 18L
DOW CHEMICAL CO, PLASTIC PRODUCTS
2040 DOW CENTER
MIDLAND, MI 48640

CF K-798
CHEMFAB/CHEMICAL FABRICS CORP.
WATER ST.
P.O. BOX 476-T
NORTH BENNINGTON, VT 05257
(802) 447-1131

KAPTON LCL 1074
DUPONT CHEMICAL CO.
POLYMER PRODUCTS DEPT. ELASTOMERS DIV.
WILMINGTON, DE 19898
(800) 441-7111
PVC F.S. #813500K041383

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Flammability, Odor and Offgassing Procedure for Materials in Environments that Support Combustion, 145 pages. Office of Space Transportation Systems 1981 NHB 8060.1B.

Standard Test Method For Evaluating Triboelectric Charge Generation and Decay, 10 pages. Malfunction/Materials Analysis Section, Materials Analysis Branch, Fluids and Analysis Division, Ground Systems Directorate 1979 MMA 1985-79.

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1. Report No. TM 103500	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Physical and Chemical Test Results of Plastic Films		5. Report Date October 29, 1986	
7. Author(s) R. H. Gompf, PE		6. Performing Organization Code DM-MSL-2	
9. Performing Organization Name and Address Materials Testing Branch, DM-MSL-2 Kennedy space Center, FL 32899		8. Performing Organization Report No. MTB-402-85	
12. Sponsoring Agency Name and Address		10. Work Unit No.	
		11. Contract or Grant No.	
		13. Type of Report and Period Covered	
		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract This test program was initiated because a need existed at the Kennedy Space Center (KSC) to have this information readily available to the engineer who must make the choice of which plastic film to use in a specific application. Much of the information contained in this report has never previously been available while the rest was scattered around in numerous special test reports. Included in this report are test results of 59 thin plastic films. Tests were done and the data compiled in the following areas: (1) Flammability, (2) Electrostatics, (3) Hypergolic compatibility, (4) Outgassing, (5) Chemical compatibility, (6) Spencer Impact, (7) Optical, and (8) Heat Sealability.			
17. Key Words (Suggested by Author(s)) Electrostatic, Triboelectric, Plastic Film, Flammability, Hypergolic Compatability, Off Gassing, Light Transmission, Chemical Compatability	18. Distribution Statement Unlimited		
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of pages 78	22. Price